MAYA VEHICLES
Evolve real-life designs into a mind-blowing submersible

6GB OF FREE ASSETS
VIDEOS, MODELS & MORE

www.3DArtistonline.com

3DArtist

87

P...al inspir...

3DS MAX
Develop your simulation skills

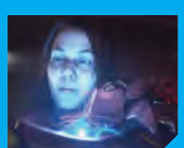
CREATE THIS EPIC IMAGE
PAGE 36

25 INCREDIBLE DESTRUCTION TIPS
Industry experts teach you how to blow stuff up

ZBRUSH HAIR & FUR
Master unbelievably detailed and stylised characters in 17 easy to follow steps

PLUS
- MODO mastered
- Houdini techniques
- Cinema 4D reviewed
- New Nvidia GPUs

REALISTIC CLOTHING
Get Marvelous Designer working for you in ZBrush



HALO 5: GUARDIANS
Axis reveals how it brought 343's blockbuster to life

WETA SECRETS REVEALED
Discover the history of MARI, from Avatar to The Foundry

DigitalEdition GreatDigitalMags.com ISSUE 087
ip IMAGINE PUBLISHING

ZBRUSH 4R7®
IMAGE COURTESY OF HOOMAN RAHATI
SEE THE MAKING-OF AT ZBRUSHCENTRAL.COM:
HTTP://ZBRU.SH/RAHATI
Pixologic
PIXOLOGIC.COM
THE ALL-IN-ONE DIGITAL SCULPTING SOLUTION.
DESIGNED FOR THE PURSUIT OF ART.

> We need to exaggerate some volumes to avoid losing the desired contour when we add the fibres

Pablo Muñoz Gómez on refining the model **Page 38**

Render this beast Page 36

Pablo Muñoz Gómez
pablander.com

Software ZBrush, Photoshop

Create realistic clothing **Page 58**

Welcome

To the magazine and 100 pages of amazing 3D

Welcome to **3D Artist**! Many artists will tell you that the key to creating a strong character in 3D that feels interesting and believable is to have a strong idea of the character's backstory. I suppose the key is to act like a storyteller – even if you're creating a still image, having a story in your mind will pay dividends in your character work.

Someone who believes in this quite strongly is our superb cover artist Pablo Muñoz Gómez, whose Lost Creatures characters each have their own personalities and behaviour patterns. He's invented a coherent world for them to inhabit, which directly informs their designs. You can read his thoughts on the matter on p36, and learn from his expertise when it comes to creating incredible hair and fur effects in ZBrush.

Elsewhere in this packed issue you can learn how to integrate Marvelous Designer into a ZBrush workflow to create realistic clothing for a dynamic character, build a magnificent mech in MODO, turn real-life inspiration into incredible Maya concept vehicles, explore a tree formation system in 3ds Max FumeFX and make your scenes look pretty in Houdini with volumetric lighting. We've also spoken to the guys from Weta and The Foundry about the history of MARI and industry pros reveal their top destruction tips. Enjoy!

Steve Holmes, Editor

Sign up, share your art and chat to other artists at **www.3dartistonline.com**

Get in touch... 3dartist@imagine-publishing.co.uk @3DArtist Facebook.com/3DArtistMagazine

3DArtist

Imagine Publishing Ltd
Richmond House, 33 Richmond Hill
Bournemouth, Dorset BH2 6EZ
☎ +44 (0) 1202 586200
Web: www.imagine-publishing.co.uk
www.3dartistonline.com
www.greatdigitalmags.com

Magazine team

Editor Steve Holmes
stephen.holmes@imagine-publishing.co.uk
☎ 01202 586248
Editor in Chief Dan Hutchinson
Production Editor Carrie Mok
Designer Lukasz Dyakowski
Photographer James Sheppard
Senior Art Editor Will Shum
Publishing Director Aaron Asadi
Head of Design Ross Andrews

Contributors
Orestis Bastounis, Paul Champion, James Clarke, Vikrant Dalal, Nicolas Delille, Rainer Duda, Tor Frick, Pablo Muñoz Gómez, Caleb Nefzen, Poz Watson, Colie Wertz

Advertising
Digital or printed media packs are available on request.
Head of Sales Hang Deretz ☎ 01202 586442
hang.deretz@imagine-publishing.co.uk
Account Manager Simon Hall ☎ 01202 586415
simon.hall@imagine-publishing.co.uk

FileSlio.co.uk
Assets and resource files for this magazine can be found on this website. Register now to unlock thousands of useful files.
Support: filesilohelp@imagine-publishing.co.uk

International
3D Artist is available for licensing. Contact the International department to discuss partnership opportunities.
Head of International Licensing Cathy Blackman
☎ +44 (0) 1202 586401
licensing@imagine-publishing.co.uk

Subscriptions
To order a subscription to **3D Artist**:
☎ UK 0844 249 0472
☎ Overseas +44 (0) 1795 592951
Email: 3dartist@servicehelpline.co.uk
6-issue subscription (UK) – £21.60
13-issue subscription (UK) – £62.40
13-issue subscription (Europe) – £70
13-issue subscription (ROW) – £80

Circulation
Head of Circulation Darren Pearce ☎ 01202 586200

Production
Production Director Jane Hawkins ☎ 01202 586200

Finance
Finance Director Marco Peroni

Founder
Group Managing Director Damian Butt

Printing & Distribution
Printed by William Gibbons & Sons Ltd, 26 Planetary Road, Willenhall, West Midlands, WV13 3XT

Distributed in the UK, Eire & the Rest of the World by Marketforce, 5 Churchill Place, Canary Wharf, London E14 5HU
☎ 0203 787 9060, www.marketforce.co.uk

Distributed in Australia by Network Services (a division of Bauer Media Group), Level 21 Civic Tower, 66-68 Goulburn Street, Sydney, New South Wales 2000, Australia ☎ +61 2 8667 5288

Disclaimer
The publisher cannot accept responsibility for any unsolicited material lost or damaged in the post. All text and layout is the copyright of Imagine Publishing Ltd. Nothing in this magazine may be reproduced in whole or part without the written permission of the publisher. All copyrights are recognised and used specifically for the purpose of criticism and review. Although the magazine has endeavoured to ensure all information is correct at time of print, prices and availability may change. This magazine is fully independent and not affiliated in any way with the companies mentioned herein. If you submit material to Imagine Publishing via post, email, social network or any other means, you automatically grant Imagine Publishing an irrevocable, perpetual, royalty-free license to use the material across its entire portfolio, in print, online and digital, and to deliver the material to existing and future clients, including but not limited to international licensees for reproduction in international, licensed editions of Imagine products. Any material you submit is sent at your risk and, although every care is taken, neither Imagine Publishing nor its employees, agents or subcontractors shall be liable for the loss or damage.

© Imagine Publishing Ltd 2015

ISSN 1759-9636

recycle
When you have finished with this magazine please recycle it

Elevate Your Workflow with Dedicated Rendering

renderPRO

Render or simulate at your desk or on the go because the versatile renderPRO is configurable with up to two Intel® Xeon® processors (28 cores) and requires only power and a network connection.

renderBOXX

The ultimate cornerstone of your render farm, renderBOXX features dual Intel® Xeon® processors (up to 36 physical cores). Ten modules fit neatly into a 4U (7"x19") space and IPMI 2.0 technology with KVM over IP provides the finest in network management.

RenderFarm on Wheels

Available in a wide range of sizes and expandable to over 80 modules (2880 cores), ROW is the ultimate turn-key render farm featuring rack-mounted, dual CPU render nodes housed in a mobile enclosure.

BREAKING NEWS

Introducing the World's **Smallest**

Overclocked & Liquid-Cooled Workstation

APEXX 1

For more information on BOXX rendering solutions, visit:
www.boxx-tech.co.uk OR call 01256 378000

BOXX Centerprise INTERNATIONAL

Intel, the Intel logo and Iris are trademarks of Intel Corporation in the U.S. and/or other countries.

The Expert Panel

This issue's team of pro artists...

PABLO MUÑOZ GÓMEZ

pablander.com

We've been big fans of Pablo's Lost Creatures series of characters for quite some time, so we got him to make one especially for us. Learn how to re-create it yourself in ZBrush on p36.

3DArtist username pablander

CALEB NEFZEN

artstation.com/artist/CalebNefzen

Marvelous Designer can be the last word in generating clothing in 3D when in the right hands. On p58, Caleb explores using it in a ZBrush workflow for modelling and texturing a Native American warrior.

3DArtist username n/a

TOR FRICK

torfrick.com

It's great to have *Wolfenstein* developer MachineGames' art director on board this month – we're big fans. On p52, Tor shows you how to develop a stylised mech using MODO.

3DArtist username Snefer

COLIE WERTZ

coliewertz.com

Legacy cover artist Colie dives into his workflow for fleshing out a Maya vehicle concept on p44, as well as revealing his approach to design work in general. He's also taken some great photos!

3DArtist username coliewertz

VIKRANT DALAL

project01studio.blogspot.in

3ds Max master Vikrant returns to the pages of **3D Artist** this month to show you how to use PFlow to generate a tree formation system. His tutorial starts over on p66.

3DArtist username n/a

RAINER DUDA

rainer-d.eu

Houdini evangelist Rainer wanted to do something a little brighter this time around. We let him loose on a volumetric lighting tutorial, so head over to p70 and start improving your Houdini renders!

3DArtist username Rainerd

NICOLAS DELILLE

modern-age-studio.com

Nicolas is, without a doubt, one of the most talented Cinema 4D artists out there at the moment, so he was the perfect candidate to review the latest version: R17.

3DArtist username ModernAgeStudio

PAUL CHAMPION

linkedin.com/in/pchampion

Paul has taken some time out from creating fantastic NUKE tutorials for us to pester a group of experts from companies like MPC, EA and Outpost for their top destruction tips on p30.

3DArtist username Rocker

ORESTIS BASTOUNIS

twitter.com/mrbastounis

Orestis returned from a well-deserved holiday to find that Steve had missed him dearly and, in an act of kindness, had sent him two PNY Nvidia GPUs to review the moment he got back. Lucky guy.

3DArtist username n/a

Chillblast

Customise your perfect workstation today
at www.chillblast.com or call 01202 068 333

The fastest PCs for
3D Design!

Fusion Projection 3 3D Artist PC

- Intel® Core™ i5-4690K Processor
- 16GB 1600MHz DDR3 Memory
- NVidia Quadro K2200 4GB Graphics Card
- 128GB Samsung M.2 PCIe SSD
- 1000GB Hard Disk
- 24x SATA DVD+/-RW Drive
- Microsoft Windows 10 Home

Just £1279 inc. VAT

Chillblast

5 TIME PC PRO AWARD WINNER

PC PRO Excellence AWARDS 2010 · PC PRO Excellence AWARDS 2011 · PC PRO Excellence AWARDS 2012 · PC PRO Excellence AWARDS 2013 · PC PRO Excellence AWARDS 2014

Fusion Photo OC Lite II

Intel® Core™ i7-6700K Processor
16GB 2133MHz DDR4 Memory
NVidia GeForce GTX 750
128GB M.2 PCIe Solid State Drive
2x 1TB Hard Disks in RAID1
Blu-Ray ReWriter Optical Drive
Microsoft Windows 10 Home

Just £1099 inc. VAT

Fusion Photo OC VI

Intel® Core™ i7-5820K Processor
32GB 2133MHz DDR4 Memory
NVidia GeForce GTX 970
250GB Solid State Drive
2x 3TB Hard Disks in RAID1
Blu-Ray ReWriter Optical Drive
17 in 1 3.5" Internal Card Reader
Microsoft Windows 10 Home

Just £1829 inc. VAT

Photo OC Mobile 15.6”

Intel® Core™ i7-4710MQ Processor
16GB 1600MHz DDR3 Memory
NVidia GeForce GTX 950M
120GB Samsung EVO mSATA SSD
1000GB Seagate Hybrid SSD/HDD
Microsoft Windows 10 Home

Just £1199 inc. VAT

£30 OFF
on Projection 3, Photo OC Lite II, Photo OC VI and Photo OC Mobile

Just use coupon code
3DADISC1015

FINANCE
AVAILABLE ON ALL SYSTEMS OVER £250*
Terms & Conditions apply.
Credit subject to status and affordability.

* Credit subject to status and affordability. Credit is provided by a panel of lenders with whom we have a commercial relationship - we are not able to provide independent advice. Terms & Conditions apply. Credit subject to status and affordability.

Intel, the Intel Logo, Intel Inside, Intel Core, and Core Inside are trademarks of Intel Corporation in the U.S. and/or other countries.
Terms and conditions are on the website. All Trademarks are acknowledged. Pictures are for illustration only. Prices are correct at time of going to press (08.10.2015). E&OE.

/chillblast @chillblast

Contents

What's in the magazine and where

News, reviews & features

10 The Gallery
A hand-picked collection of incredible artwork to inspire you

22 The changing face of MARI
Poz Watson speaks to Weta developers and industry pros about the origins of MARI and its current status as the industry's leading texture painter

30 25 incredible destruction tips
A collection of awesome FX artists reveal their secrets for creating exciting destruction sims in a variety of software

76 Review: PNY Nvidia Quadro M5000
We take a long hard look at the newest mid-range professional GPU from Nvidia

78 Review: PNY Nvidia Quadro M4000
We also get to grips with the latest lower cost professional GPU from Nvidia

80 Review: Cinema 4D R17
Nicolas Delille has had a play with Maxon's latest release to test out the raft of new features available

82 Subscribe Today!
Save money and never miss an issue by snapping up a subscription

The changing face of MARI

"MARI is a product of great collaboration between artists and developers"
Kiyoyuki Nakagaki on developing MARI **Page 24**

22

Model and kitbash a mech

52

Model and render a submersible drone

44

Build a tree with a PFlow system

66

SAVE 40%
SUBSCRIBE TODAY

Turn to page 82 for details

> Add some debris for the contact point with the ground to emphasise the impact

Luca Vitali on adding details to destruction layers **Page 30**

DOWNLOAD FROM THE FileSilo

- Three hours of ZBrush videos from Digital-Tutors, with a detailed dragon scroll
- Premium CGAxis models
- 25 Sky and environment textures from CGTotal
- Loads of tutorial files

Turn to page 96 for the complete list of this issue's free downloads

filesilo.co.uk/3dartist

Visit the **3D Artist** online shop at **imagineshop.co.uk** for back issues, books and merchandise

The Pipeline

36 Step by step: Render a furry creature concept
Pablo Muñoz Gómez highlights key hair and fur techniques in ZBrush

44 Step by step: Model and render a submersible drone
Learn from Colie Wertz how to create a cool concept vehicle

52 Step by step: Model and kitbash a mech
MachineGames' Tor Frick builds a badass robot in MODO

58 Step by step: Master realistic clothing
Learn how to integrate Marvelous Designer into a ZBrush workflow

66 Pipeline techniques: Build a tree with a PFlow system
Use 3ds Max to simulate particle tree growth

70 Pipeline techniques: Create mood with volumetric lighting
Utilise Houdini's lighting and rendering toolset

The Hub

86 Community news
We break down the much-anticipated SIGGRAPH ASIA 2015

88 Industry news
Houdini 15 comes to town and Adobe announces new apps

90 Project Focus
Halo 5: Guardians
Glaswegian studio Axis divulges all about the Xbox One exclusive

92 Industry Insider
Dominic Davenport
The founder of Escape Studios talks inspiration and the next generation

94 Readers' gallery
The 3DArtistOnline.com community art showcase

The Gallery

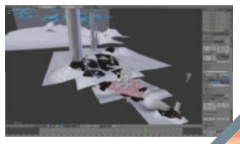
Have an image you feel passionate about? Get your artwork featured in these pages
Create your gallery today at **www.3dartistonline.com**

Alexander Gluhachev
artstation.com/artist/slir

Alexander is 26 and studied geography before becoming interested in 3D as a hobby

Software Blender, Photoshop

Work in progress...



“The image was just a random story that appeared in my head. I like to use a low-poly style when doing pictures for the soul. This style lets you relax texturing, UV unwrap, high-poly modelling and baking. This allows you to focus only on the form, colour and composition. And just as quickly as it was my brainchild, it also became reality”

Alexander Gluhachev, *MegaCity,* 2015

"I created this image when I was a beginner 3D artist. I like different cartoon houses so I decided to make something like this. I wanted to do a house which puts across some information about its inhabitant"

Anastasia Konkina, *The Flying House,* 2013

Anastasia Konkina
bit.ly/1PlHHjS

Anastasia has architectural training and she's now working on character modelling skills

Software 3ds Max, V-Ray, Photoshop

Work in progress...

“This was created as a part of my character ‘Mechanic’. I tried to find something between sci-fi and steampunk for the hand. Not too old-fashioned… not too spick and span high-tech. Just a believable piece with simple mechanics, with the overall look and feel of the character”

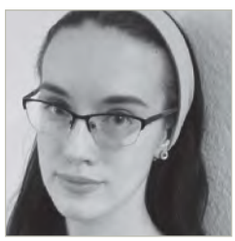
Carsten Stüben,
Mechanic hand, 2015

Carsten Stüben
carstenstueben.com

Carsten's been working as a creative director in a packaging design agency for nine years

Software ZBrush, Substance Painter, OctaneRender

Work in progress...



Aleksandrina Tchoub
artstation.com/artist/swey

Aleksandrina is 22 years old and she is a senior at Laguna College of Art and Design

Software ZBrush and Photoshop

Work in progress...

"I love exploring ways to distort and disrupt the face. Because it's such a vital part of interacting with people, it tends to provoke a visceral reaction when it's meddled with. I think good horror's all about visceral reactions, but it's not enough for it to just look gross – it has to look wrong"

Aleksandrina Tchoub, *They Only Talk to Me,* 2015

DOMAINS | MAIL | HOSTING | eSHOPS | **SERVERS**

1&1 CLOUD SERVER

TEST THE BEST!

TOP PERFORMER
CLOUD SPECTATOR

Powered by intel Cloud Technology

Easy to use – ready to go

The 1&1 Cloud Server offers unbeatable performance in terms of CPUs, RAM and SSD storage! Implement your cloud projects with the perfect combination of flexibility and powerful features.

- ✓ **Load balancing**
- ✓ **SSD storage**
- ✓ **Billing by the minute**
- ✓ **Intel® Xeon® Processor E5-2660 v2 and E5-2683 v3**

1 month free!

Then from £4.99 per month*

1 TRIAL TRY FOR 30 DAYS

1 CLICK UPGRADE OR DOWNGRADE

1 CALL SPEAK TO AN EXPERT

0333 336 5509

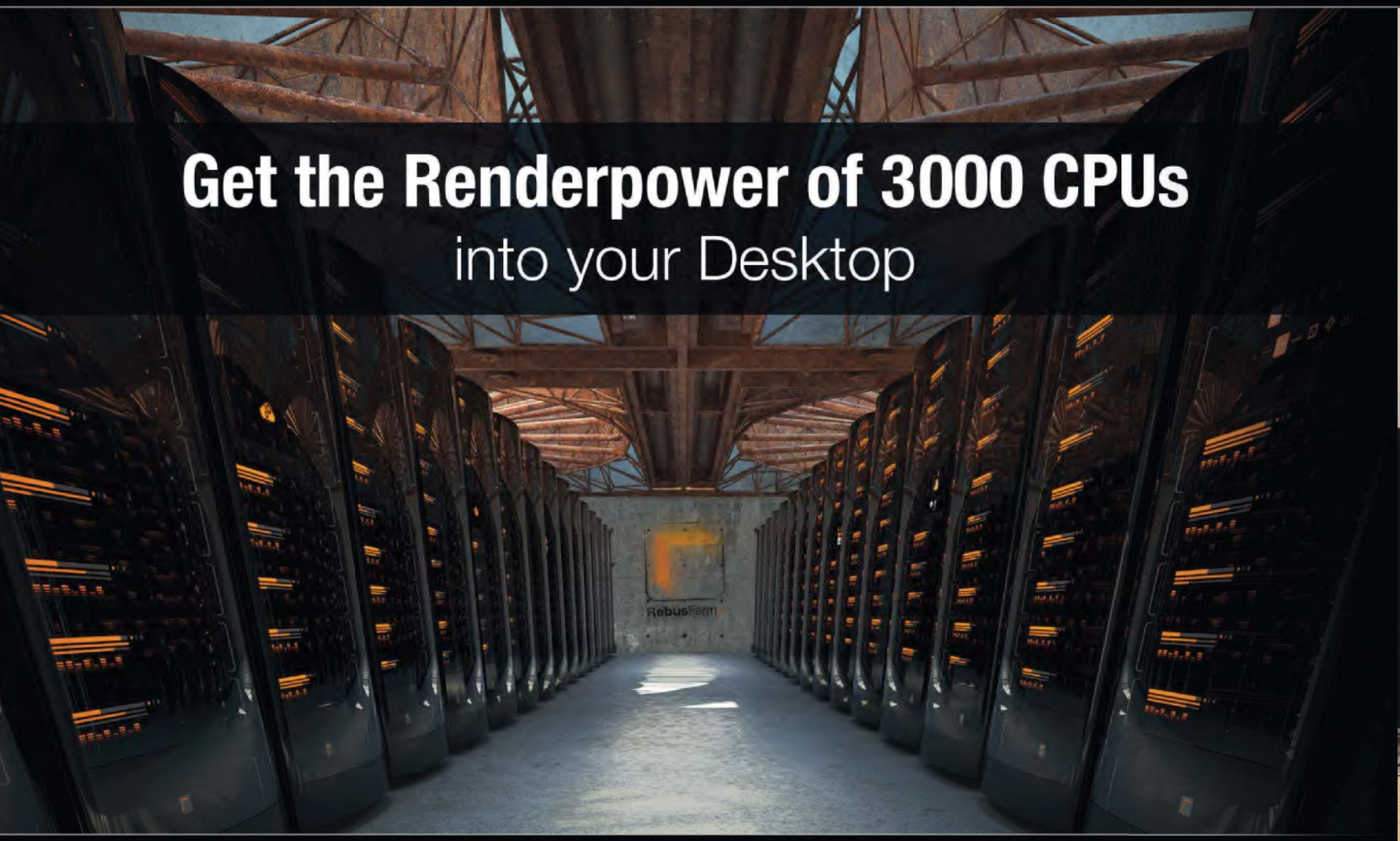
1&1

1and1.co.uk

* 1&1 Cloud Server 1 month free trial, then from £4.99 per month. No minimum contract period. Prices exclude 20% VAT. Visit 1and1.co.uk for full offer details, terms and conditions. Intel and the Intel logo are trademarks of Intel Corporation in the U.S. and/or other countries. 1&1 Internet Limited, Discovery House, 154 Southgate Street, Gloucester, GL1 2EX.

RebusFarm
Render Service

Get the Renderpower of 3000 CPUs
into your Desktop



Making your deadline in time was never cheaper, easier and faster than now!

- Best price
- No waiting time
- Advanced apps and plugins
- All major software packages supported
- 24/7 processing and support

35€
Free Trial
Only for new registrants.
Bonus Coupon Code:
3DA-RE-34Y57HX

www.RebusFarm.net

Rendered at RebusFarm Render Service

The rendering and interior design is done by DWanimations one of the leading visualization companies in The Netherlands. We specialize in Architectural and product renderings for a variety of clients. The end results can differ according to the clients' wishes, for instance: still images / virtual reality or online configuration systems.

For more work and information about DWanimations visit their page: **www.DWanimations.nl**
and connect on Facebook via: **www.facebook.com/DWanimations/**

> It took me about a month to complete this model using a few new techniques that I've never used before, and I am very happy with the outcome. I started to work on it after I found a painting in one of my reference folders that was originally from the internet and put in there a while back

Kless Gyzen, *Lake House,* 2015

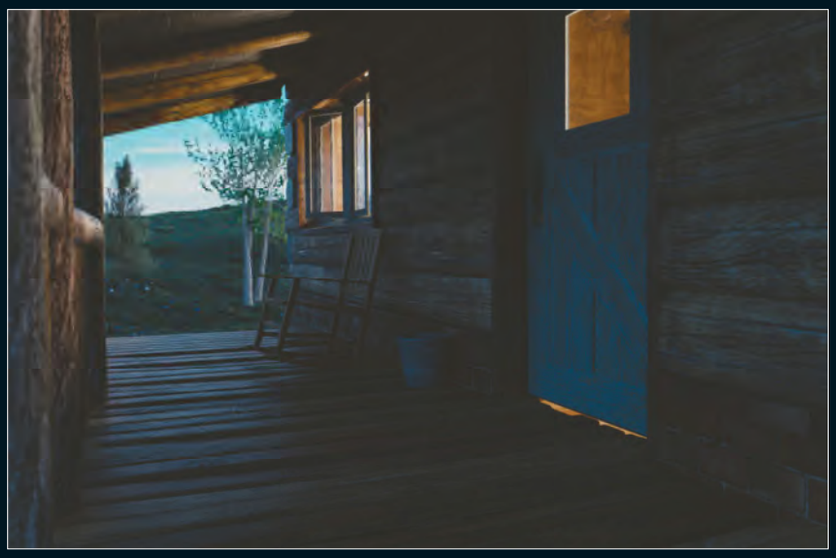
Kless Gyzen
behance.net/DonCliche

Kless is a self-taught artist and has been modelling with Blender for almost three years

Software Blender

Work in progress...

> While modelling I listened to a lot of Johnny Cash which really motivated me and inspired me to keep working
>
> **Kless Gyzen,** *Lake House,* 2015



PBR SHADERS
The shaders were one of the new techniques I've learned, since I only just started to use PBR Shaders and I really like the look of PBR materials.

TESTING
This was my second test render to see how the scene looked, before I used the film filter to get the blue colour you see in the finished render.

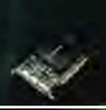
COLOUR TWEAKS
Another new technique was the use of the Color Management setting, I used the film view to get the blue tint that would normally not be there.

NVIDIA® QUADRO® ACCELERATE YOUR CREATIVITY.

Accelerate your creativity with NVIDIA® Quadro®— the world's most powerful workstation graphics.

Whether you're developing revolutionary products or telling spectacularly vivid visual stories, Quadro gives you the performance to do it brilliantly.

NVIDIA Quadro K6000 VCQK6000-PB	
NVIDIA Quadro K5200 VCQK5200-PB	
NVIDIA Quadro K5000 MAC VCQK5000MAC-PB	
NVIDIA Quadro K4200 VCQK4200-PB	

NVIDIA Quadro K2200 VCQK2200-PB	
NVIDIA Quadro K2000DVI VCQK2000DVI-PB	
NVIDIA Quadro K620 VCQK620-PB	
NVIDIA Quadro K420 VCQK420-PB	

Learn more **www.pny.eu/quadro** & **pny.quadrok-selector.com**

Insight
uk.insight.com
Tel: 0844 846 3333

Misco
www.misco.co.uk
Tel: 0800 038 8880

Dabs.com
www.dabs.com
Tel: 0870 429 3825

Scan Computers
www.scan.co.uk
Tel: 0871 472 4747

PNY® Professional Solutions

NVIDIA Quadro® / Tesla® / GRID™ / Prevail SSD

NVIDIA

© 2014 NVIDIA Corporation. All rights reserved. NVIDIA, the NVIDIA logo, and Quadro are trademarks and/or registered trademarks of NVIDIA Corporation. All company and product names are trademarks or registered trademarks of the respective owners with which they are associated.

THE CHANGING FACE OF MARI

Experts from Weta Digital explain how the 'beautiful and useful' MARI became an industry-standard painting tool

Jack Greasley has been with MARI since (almost) the very beginning. Now head of technology at The Foundry, he was senior R&D engineer on *Avatar* at Weta Digital when MARI was first created. He explains: "MARI was started in 2006 at the behest of [visual effects supervisor] Joe Letteri. During production of *King Kong*, texturing had been a large bottleneck due to the vast amount of detail needed. At that time Weta was using Studio Paint from Alias for 3D painting. This ran on large, obsolete SGI Octanes (which you can't buy anymore) and wasn't being updated. This clearly wasn't a sustainable situation. I joined Weta in 2006 to work with the texture department to find a solution."

MARI was to be that solution. Named after the Swahili word 'Maridadi', meaning beautiful and useful, MARI was developed specifically for and during the production of *Avatar*. However, the first film to be released with MARI work on it was actually *The Chronicles Of Narnia: Prince Caspian*, where some of the werewolf props were painted using the then-new software. And that slightly under-the-radar approach has continued to be part of MARI's DNA ever since. Compared to some of the other professional VFX tools out there, it's rarely talked about, and yet now, "almost every asset, in every VFX movie is painted using MARI," says Greasley. "There are one or two notable exceptions such as Disney animation movies (they have their own awesome solution called Paint 3D)," but essentially, MARI is the only texture tool in town.

When Greasley joined Weta in 2006, the average workstation in the facility had eight or 16 gigabytes of memory and the GPUs had one gigabyte. "The artists wanted to be able to view and paint full sets of textures," he explains. "The main problem we had to solve was 'How do we edit tens or hundreds of gigabytes of data on machines that have much less memory than that? And how do we make it fluid, smooth and artist friendly?'" They realised that although the full texture set was many billions of pixels, only a relatively small number of those pixels could be displayed on screen at once. "If we could work out which pixels were visible," says Greasley, "we could load just those pixels into the RAM, leaving the rest of them on disk."

From that realisation, they then went on to spend six months building an engine that could load, display and edit images where most of the image data is on disk. "To do this we split each image into fixed-sized tiles (256 x 256 pixels to be precise). A 1024 x 1024 pixel texture would be split into a 4 x 4 grid of tiles (256 x 4 = 1024 pixels). Each image was then also mipmapped, so for a 1024 x 1024 pixel image we actually store 1024 x 1024, 512 x 512 and 256 x 256 versions, each broken into tiles," says Greasley. With that engine done, they could perform basic image-editing tasks – like painting and colour adjusting – on a tile-by-tile basis.

On top of that Greasley and his small team built a 3D rendering engine. Although the software evolved on an almost day-to-day basis, Greasley thinks back on MARI in terms of three main periods. The first period was essentially a proof-of-concept system, or "in art terms you could think of it as a preparatory sketch," says Greasley, "It could only load a single model (Gollum from *Lord Of The Rings* in this case) and you could paint with some basic brushes. The code was awful, hacky and held together with string."

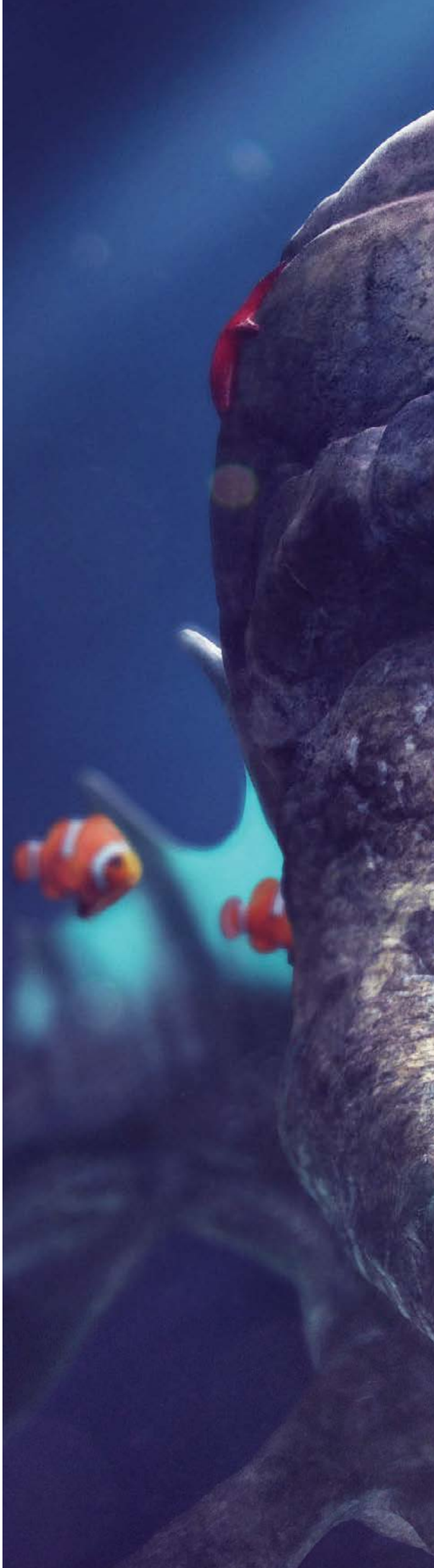


Image by Henning Sanden

For Faris, Mohamed Abdelfatah took care when using "Adjustment Layers and Layer Masks to make the texture greyscale and [in order to] adjust levels on the overall [model]"

From there MARI and *Avatar*'s development began to align, with each feeding the other. "At the time of the invention of MARI, there was a strong demand for putting great details into textures," says senior developer Kiyoyuki Nakagaki, who – like Greasley – is now at The Foundry. "The most important goal of MARI has been to allow artists to paint into a large number of textures seamlessly without hassle. There have been an average of about three developers working on MARI, but we received lots of feedback directly from talented artists in the texture department of Weta. They gave lots of inspirations and suggestions to the development of MARI, and MARI is a product of great collaboration between artists and developers."

And that developing process was what Greasley thinks of as the second incarnation of MARI: "The second phase was pre-0.5 [which took] about three or so years, and had an initial version of the data handling and rendering code. This version included some technical dead-ends that, although functional, were either overly complex or inefficient... Based off lessons learned during this period, we rewrote both the data handling and rendering code to make version 0.5. This is the first version that can be considered to be MARI in its current form. The interaction was smooth and fluid, and the painting tools mostly written."

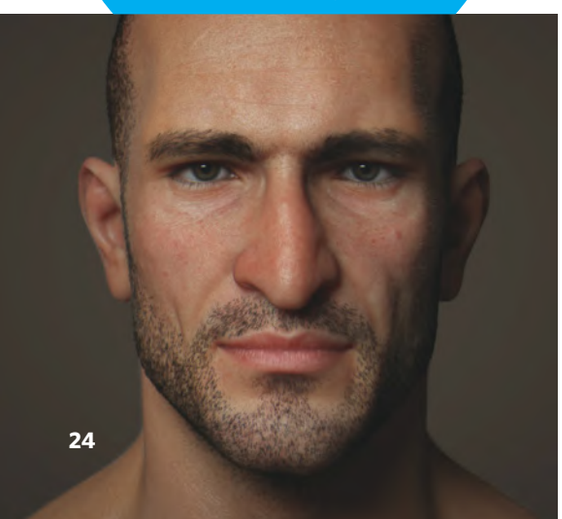
After being used to stunning effect on *Avatar*, Weta also used MARI on *The Day The Earth Stood Still*, *The Adventures Of Tintin: The Secret Of The Unicorn* and *The Lovely Bones*. Then, in 2010, The Foundry acquired the rights to commercialise MARI. "This is something we'd planned for since starting MARI and we were in a good position," says Greasley. "Often internal tools at big companies are closely tied into the pipeline. Untangling them can take a long time and lots of very complicated software engineering. With MARI we made a conscious decision to avoid this. Any Weta-specific code was written into plugins, leaving the code of MARI very portable."

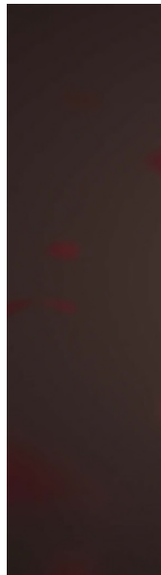
"[I also used] Adjustment Layers like HSL, Saturation and Color Balance. I focused on making the texture colour look realistic and neutral, no vivid colours," says Abdelfatah

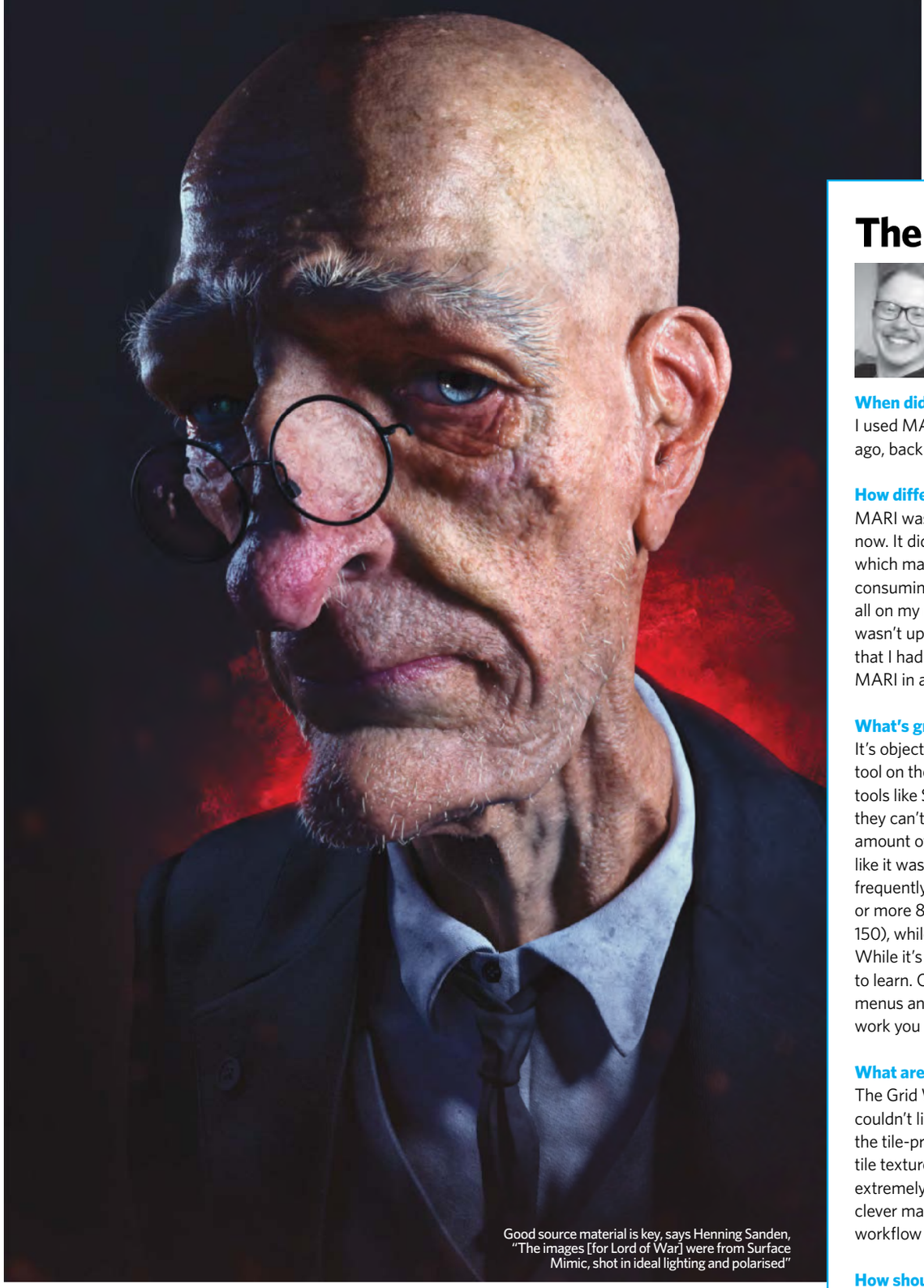
Layering textures

"Always paint your textures as layers (for example, a layer for base material, a layer for the scratches, a layer for the dirt and so on), and make good use of both painting in 3D and on UV"

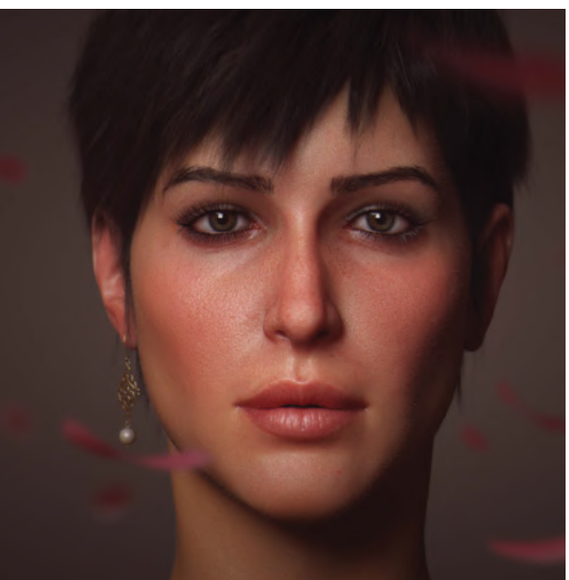
Mohamed Abdelfatah







Good source material is key, says Henning Sanden, "The images [for Lord of War] were from Surface Mimic, shot in ideal lighting and polarised"



The MARI user

Currently working at Framestore, Henning Sanden is a big fan of the texturing options available in MARI

When did you first use MARI?
I used MARI for the first time three years ago, back in version 1.4. Good times.

How different was it back then?
MARI was way more complicated than it is now. It didn't have a proper layer system, which made texturing really time consuming. It also didn't run smoothly at all on my machine, as my graphics card wasn't up to par. It wasn't until version 2 that I had a proper card; finally I could run MARI in all its glory!

What's great about it now?
It's objectively the most powerful texturing tool on the market. While you have other tools like Substance Painter and Mudbox, they can't even get close to handling the amount of data which MARI chugs through like it was its morning coffee. I have frequently worked with characters with 50 or more 8K UDIMs at work (the record is 150), while still having good performance. While it's powerful, it's also relatively easy to learn. Of course, there is a plethora of menus and buttons, but to make MARI work you really only need a few tools.

What are your favourite MARI features?
The Grid Warp feature is wonderful and I couldn't live without it. I also really enjoy the tile-procedural layer. This allows you to tile textures across your model, which is extremely powerful. Combine this with clever masking, and you have a great workflow on your hands.

How should it develop next?
I really wish it had normal-based painting. Currently MARI only has projection painting (which is on glass and is projected). This is great for a lot of cases, but the moment you want to hand paint anything complex, it's a real pain. Painting fingers, for instance, is no fun at all – you have to rotate and project repeatedly. Mudbox and ZBrush, which paint on the normal of the object, are lightning fast at hand painting. I find that I have to bring my model into Mudbox to paint masks – something I do a fair bit. Having symmetry and fast normal-based painting saves a lot of time, compared to doing it all in MARI.

Software compatibility

"MARI is the only software that allows me to work on very big assets with virtually infinite textures and UDIMs. It also runs on a wider hardware range, which makes it easier for me to work with it, even from home"

Daniele Orsetti

Greasley went with MARI to The Foundry and it only took about four months for him to get the first commercial version of MARI out the door. Running on Linux to begin with, it was soon joined by a Windows version. Suddenly artists from all over the world could get their hands on its painting power. "I started using MARI when I moved to MPC London to work as a texture artist and it completely revolutionised my workflow," says Daniele Orsetti (**dayno.it**). It was already recognisably the MARI that we know today, but "the main difference is that it didn't have the layer structure that version 2 introduced, so it was a bit harder to work with big quantities of textures," he says.

For Abraão Segundo (**abraaosegundo.com**), the advantage the MARI he uses now has over the one he first used is that "you don't [have to] worry about problems with UV seams." Adam Sacco (**soulty.com**) admits he was a little late to the MARI party. "I think it was around 2013 when I was making a neanderthal 3D model [with] a lot of organic UDIM textures that I decided it was time to learn MARI... or use Mudbox's crappy brushes," he says. "I found it very easy to learn, and coming from a digital painting background it was very natural painting textures with MARI's brushes and masks."

These days, MARI is simply "the industry standard for VFX texturing painting. Almost every Hollywood movie released over the last three years used MARI as its texture painting solution," says Greasley. "We're especially proud that for the last two years, every VFX Oscar-nominated movie has used MARI extensively. MARI is used both in traditional film VFX and animated features, with Pixar, Dreamworks and Sony Picture Imageworks using MARI." It's also used in the videogames industry, he points out, with Ready At Dawn's *The Order: 1886* and Wargaming's *World Of Tanks* being notable examples.

Orsetti used MARI when he worked on *World War Z*. "My team had to work on a big number of crowd zombies," he says. "We had to create a lot of crowd variations but also different textures for the various stages of zombification of every single character. MARI helped us immensely to keep the work consistent between different artists by sharing the same base textures and to deliver all the textures quickly and efficiently."

This Neanderthal Study was the first time that Adam Sacco had tried to use MARI

A history of MARI

We take a look at the tool that's been nine years in the making

2006

Joe Letteri starts to develop a paint tool that can handle modern VFX, while retaining the real-world reference of physical painting. Jack Greasley joins Weta.

2009

Kiyoyuki Nakagaki joins Weta. MARI 0.1 is released for internal use at Weta. It offers basic painting and the projection of multiple texture images.

2010

The Foundry releases MARI 1.0 so that other people and FX houses can use it too (on Linux). MARI version 1.1 adds support for machines running Windows.

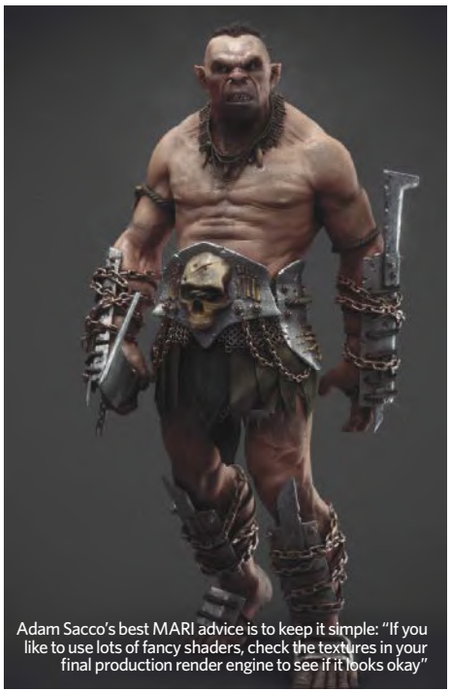
2010

As one of the earliest adopters of the tool, Baseblack makes use of MARI to help them create multiple shots for the two-parter *Harry Potter And The Deathly Hallows.*

Ready At Dawn's *The Order: 1866* made extensive use of MARI. Image courtesy of Ready At Dawn

But it's not just the big VFX houses that use MARI; artists are using the texture painting tool on their freelance and personal projects too. Mohamed Abdelfatah (mohamedabdelfatah.com) explains: "I use MARI basically for texture painting organic and complex models. After I finish modelling and sculpting I send the models to MARI; I use it to paint the Colour maps, Specular maps, Roughness maps, masks and so on – any kind of maps that I need for the shader to achieve a realistic look. And then I send the maps to 3ds Max for final shading and rendering."

Henning Sanden (henningsanden.com) used MARI significantly when working on his image Lord of War. "Hardly any details are sculpted in ZBrush, it's all MARI. I began by finding really good reference. As a texture artist, reference is king... I brought all the images into MARI and simply projected them onto the model, using the Paint Through tool. As my model is fairly stylised in terms of the shapes, I had to use the Grid Warp tool along with the Smudge tool to make the images fit. I started out with few segments and added more as the image matched closer to the model, to really have the fine control I needed... The second MARI phase was to make all the fine



Adam Sacco's best MARI advice is to keep it simple: "If you like to use lots of fancy shaders, check the textures in your final production render engine to see if it looks okay"

The Avatar era

Weta certainly had its work cut out – it developed new software while working on challenging CG

MARI's first user was a look-development artist called Nikolay Gabchenko, who was working on the direhorses in *Avatar*. "At this point MARI could only really paint in black and white and had a very basic brush engine," says Greasley. "We worked very closely with Nick, sometimes releasing new versions to him three times a day."

As *Avatar* progressed, so did MARI. "At its peak over 60 texture artists were using MARI daily on *Avatar*," says Greasley. "With a very small team we needed to both develop and support a very much work-in-progress application. This required a large amount of patience and understanding from our users and very close support from the developers. We would often develop features specifically for individual users and work with them to refine and test code as it was developed. It wasn't unusual for users to have their own build [for testing]."

Nakagaki agrees that there was always pressure that came "from production requirements and deadlines. We very often went out of the development room to artists' desk, sit with artists side by side and solved various issues together. It was often challenging to come up with the best solutions for issues blocking production and implement them in a timely manner so that artists can meet their deadlines."

But the end result was worth it. MARI now allows artists all over the world to do the most incredible things, though from a technical point of view the thing that Greasley is most proud of is "the data-handling engine (called the DDI) and the associated texturing system (called SVT). This was developed in 2007 and is still going strong, handling some pretty massive assets. The largest asset I've seen in production is over 65,000 4K textures, which is a staggering amount of data."

2011

Digital Domain uses MARI 1.3 for the first time on *Thor*, and that's partly due to the fact that a MARI/NUKE bridge enables them to streamline their pipeline.

2011

***Hugo* wins the Academy Award for Best Visual Effects, after Pixomondo used a pipeline of NUKE, OCULA and MARI to work on the steampunk film.**

2013

MARI 2.0 is finally released with features that include an exciting new layer system that includes procedural layers, mask groups and shared layers.

2014

MARI 2.5 is integrated into the DreamWorks Animation pipeline so the characters in *Mr Peabody & Sherman* are 3D, but still reminiscent of the 2D original.

2015

Coming soon in 2015, MARI version 3.0 will be released with an exposed node graph. It will also provide artists with the ability to access MODO's photorealistic renderer.

Paddington image courtesy of Heyday Films, Studio Canal and Framestore

Persevere with learning MARI

"Be patient when painting textures and use a lot of reference photos. I think MARI is an amazing painting package for any 3D artist and it is well worth the time to learn"

Adam Sacco

"When you start a new project," Abraão Segundo suggests, "remember to take good references and use software that can enhance your work and your workflow"

skin details. Normally I would do this in ZBrush using Alphas, but over the last year I've started doing nearly all my fine details in MARI. The reason is that I get a lot more resolution out of it, I have far more control and it's simply easier to do."

Sacco's workflow "is to paint a quick base coat in ZBrush and export as an 8K map or four to ten 4K UDIMs. Open these up in MARI and hand paint the Colour and Bump maps. I don't bother with other maps as they can be easily painted in ZBrush or Photoshop to save time. I use the standard MARI setup and brushes to paint everything but I do start with the base colour and some seamless textures."

Abdelfatah likes "the improvements on the shaders, lighting and layers," adding "MARI 3.0 will come with great new features as The Foundry has announced. For example it will have Arnold, V-Ray, Unreal and Redshift Shaders; I personally can't wait to use those."

Indeed, MARI 3.0 will be released soon and Greasley says it is a "very much mature and well-rounded application compared to 1.0. The core set of painting tools remain very similar to those launched on day one, but the surrounding application has grown considerably. Version 1.0 was very targeted towards high-end VFX asset painting. It did that very well if you fully adopted the MARI way of working, but could be difficult to introduce into existing workflows. The addition of the Python and C APIs allowed facilities to make MARI play their way. Adding in the layers system with 2.0 meant MARI felt familiar to artists coming from other traditional painting systems."

He notes that "Tools surrounding MARI have also adapted and embraced MARI's view of the world, especially UDIM texturing. Tools such as Maya, Houdini, RenderMan, Arnold and V-Ray have all added native support for UDIM-based textures, making it very easy for MARI to be the centre of artists texturing workflows." Some of the new features of MARI 3.0 will include MODO rendering and baking, an exposed node graph, Gizmos, OpenSubdiv support, colour space management, FBX geometry support and more.

But where will MARI go next? It's already conquered the film world, and the games world is certainly catching up. Greasley notes that its use is "starting to crop up in VR work as well, especially in high-quality photogrammetry workflows. Scott Metzger and his company Nurulize are great examples of this."

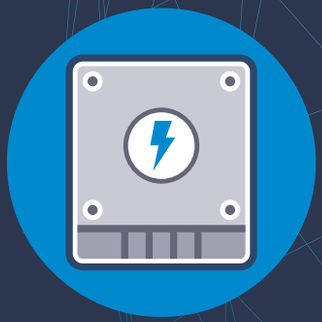
But that doesn't mean the software will be changing direction. Indeed, Greasley says: "The main focus for MARI going forward is expanding the painting and image editing toolkit and making the materials system more powerful." And while MARI users seem happy with their software, that doesn't mean they don't have some suggestions as to how to make it better. Abdelfatah is after "symmetry painting across axes" and Sacco is desperate for an improved mirror function. For Orsetti, the dream is "the possibility to create effects based on baked maps, for example scratches on edges, contact dirt and so on. MARI gives absolute freedom to achieve those results but I would've benefitted from a more automated approach [in some scenarios]."

MARI has certainly come a long way in a relatively short space of time. "I sometimes use Mudbox to hand paint areas, like masks, though I really stay in MARI for the majority of the time when texturing," says Sanden. "MARI is very tightly integrated into my personal project pipeline and at work. There is no way I could texture without MARI today, as it's so ingrained in my spine." And Orsetti isn't the only one. During the early days, Greasley says he'd "speak to new companies where artists would swear they'd use Photoshop forever. I'd revisit later and talk to the same artists who would admit, still slightly shocked, that they'd not opened Photoshop in days."

Cluster

Our revolutionary NEW Web Hosting platform

100% guaranteed uptime!



Smart SSD storage & intelligent load balancing

Dedicated SSL certificates

Web Hosting from:

£1.99

per month ex VAT charged at 20%

Call **0333 0142 708**

or visit **fasthosts.co.uk/hosting**

SERVERS · WEB HOSTING · DOMAIN NAMES · EXCHANGE EMAIL

fasthosts

25 TIPS AND TRICKS FOR DESTRUCTION

From explosions and shattering to dust and debris, these 25 kick-ass tips are essential for getting the most out of destructive VFX

Make no mistake; the art of destruction is a challenging task. Acclaimed directors such as Michael Bay and Roland Emmerich have both indulged in raising the bar by asking studios to bring world-class FX to the big screen. And as an FX artist working today, you'll be expected to deliver an increasingly ambitious list of dazzling destruction shots to cater for moviegoers' expectations, which continue to rise from one mega blockbuster to the next.

Often the destruction can take different forms. For example, you only need to look at scenes like Godzilla razing cities to the ground, spaceships crashing in *Prometheus* or cyborgs battling to the death in *Terminator* to see the varieties of destruction on offer. And movies such as *Man Of Steel* and *Avengers Assemble* feature prolonged jaw-dropping destruction sequences too.

To help you get on the road to learning how to create your own incredible destruction FX shots, **3D Artist** asked some of the best practitioners in the field for their expert advice, tips, tricks and workflows suitable for all levels of ability. In the following tips you'll find advice and wisdom on setting up and dealing with debris, considerations for destroying different materials such as wood and glass, the best workflows and optimisations to save time and resources, tips on animating destruction, lessons on the importance of secondary simulations and creative ways to achieve better realism.

DEBRIS

01 Small stones should transition smoothly into fine sand Ensure that your simulation has plenty of texture by simulating a wide range of debris sizes – every size imaginable from large sections to fine particulates – and avoid leaving gaps. **Nigel Ankers**

02 Add layers of detail to destruction Add some debris for the contact point with the ground to emphasise the impact. This can help to add fine details, more realism and complexity into the shot as well as help blend everything together. **Luca Vitali**

03 Constrain your clusters and cluster your constraints By creating cluster constraints among your debris in Houdini and then creating even further, higher-level constraints among those

Secondary simulations add an extra sense of drama to a good, more physically accurate base without rerunning computationally expensive simulations

Godzilla still courtesy of MPC

Tip 19

EXPERTS

NIGEL ANKERS
moving-picture.com
FX lead at MPC

ZELJKO BARCAN
criteriongames.com
VFX director at Criterion Games

KEN BEAUCHAMP
moving-picture.com
FX lead at MPC

RAINER DUDA
rainer-d.de
CEO, Research and Development 3D Technologies

JOE GUNN
joegunn3D.com
VFX artist

ROB HOPPER
moving-picture.com
Head of FX at MPC

KAI KOSTACK
kostackstudio.de
3D artist and animator

ANDREW MELNYCHUK-OSEEN
blizzard.com
FX artist at Blizzard Entertainment

MANUEL PEREZ SANZ
outpostvfx.co.uk
FX artist at Outpost VFX

NICHOLAS PLIATSIKAS
criteriongames.com
Senior technical artist/ associate CG supervisor at Criterion Games

TOM ROWELL
outpostvfx.co.uk
Head of development at Outpost VFX

LUCA VITALI
moving-picture.com
FX TD at MPC

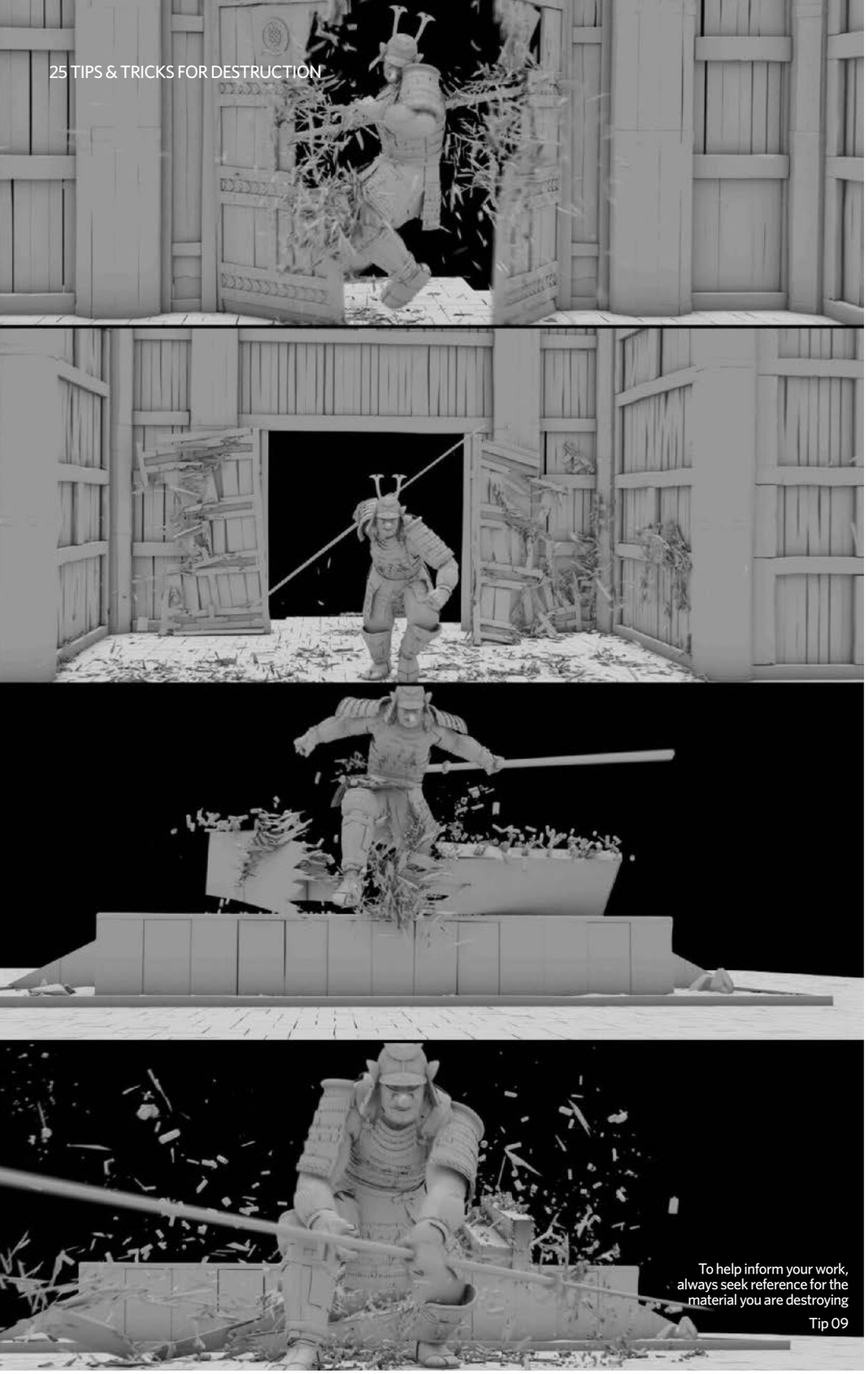
clusters, you will achieve much more realistic-looking break patterns and physical behaviours. **Zeljko Barcan**

04 Paint debris density areas yourself With a Paint SOP in Houdini, paint areas to have more debris than others. Output to a Scatter SOP and use the alternative attribute colour. Put in the colour attribute (Cd) and the node will use the colour to spread the points. Attribute bias lets you define the number of points around your painted area. **Rainer Duda**

05 Add realistic dust with Blender's smoke simulator Destruction often produces a lot of dust and since dust is, concept-wise, pretty close to what we call smoke we can use the smoke

Prometheus still courtesy of MPC

Tip 01



To help inform your work, always seek reference for the material you are destroying

Tip 09

This render shows Newton's apple hitting Earth as part of an art exhibition in New York

Tip 06

DERIVING A CONSTRAINT NETWORK FROM VORONOI

with Andrew Melnychuk-Oseen

This network is key for glass in Houdini to allow for easy communication of the constraints to the inside faces. So when a constraint breaks, it can then send a trigger to the inside face that it was derived from. To do this, give each inside face a primitive attribute called 'id'. On the Voronoi cells, the inside faces are in pairs. Using a Facet SOP and a carve, crush the polygons down to a single point. Make sure you promote the primitive attribute to this point and run a fuse on these points. On the unfused points, use a near-point lookup on the fused points to assign a unique attribute to them. Use an Add SOP to connect by unique attribute. This will allow for easy attribute promotion from the original Voronoi cells to the constraint network, and you can do many things with this; when constraints break, they will reveal the inside faces that they were made from.

simulator with negative temperature values to emulate dust effectively. **Kai Kostack**

06 Particle-based destruction For fine-grained destruction, particle systems can be useful for adding granular detail to scenes. This would be otherwise impossible when using rigid-body physics. **Kai Kostack**

MATERIALS

07 Real materials Pixelux DMM for Maya is incredibly powerful for creating realistic destruction simulations. It uses real-world material properties so your simulation can feature rigid, plastic and elastic deformations. **Tom Rowell**

08 Shape your Voronoi cells Apply rest coordinates to your glass pane before your Voronoi and change its shape. Scale it in one direction and after the Voronoi, return the position to the rest coordinate. This gives your Voronoi cells different shapes. **Andrew Melnychuk-Oseen**

09 Not everything breaks the same way Always keep in mind what you are destroying. What type of material is it made out of? Does it flex or bend before breaking? Or does it shatter? This will help achieve realism in the destruction. **Ken Beauchamp**

10 Think about the structures of the objects you're destroying For example, walls generally have multiple layers of materials; use the amount of detail that makes sense for your shot, but don't forget the internal structures. **Nicholas Pliatsikas**

11 Voronoi fractures can be used to generate believable broken wood Scale down your

In this concrete pillar destruction a lot of dust needs to be generated to sell the effect

Tip 05

EDGE DISPLACEMENT WITH HOUDINI

with Andrew Melnychuk-Oseen

After the sim is done, you will want to extract the transform attributes such as pivot, orientation and position from your rigid body simulation. Take your presimmed geometry and transfer the above attributes onto them. Apply some simple maths to transform your original geometry with the RBD attributes. Subtract the pivot, apply the orientation, reapply the pivot and apply the position information. With these attributes on the geometry, you can reverse the transform of the RBDs in a shader back to a rest state. Displace them along certain tangents of the rest space. These directions can then be retransformed by the RBD transformation attributes back into the object space of the RBD.

geometry non-uniformly in one axis before fracturing it, then scale it back after the fracture to generate wood-like fractures. Don't forget to use clustering. **Nicholas Pliatsikas**

WORKFLOW

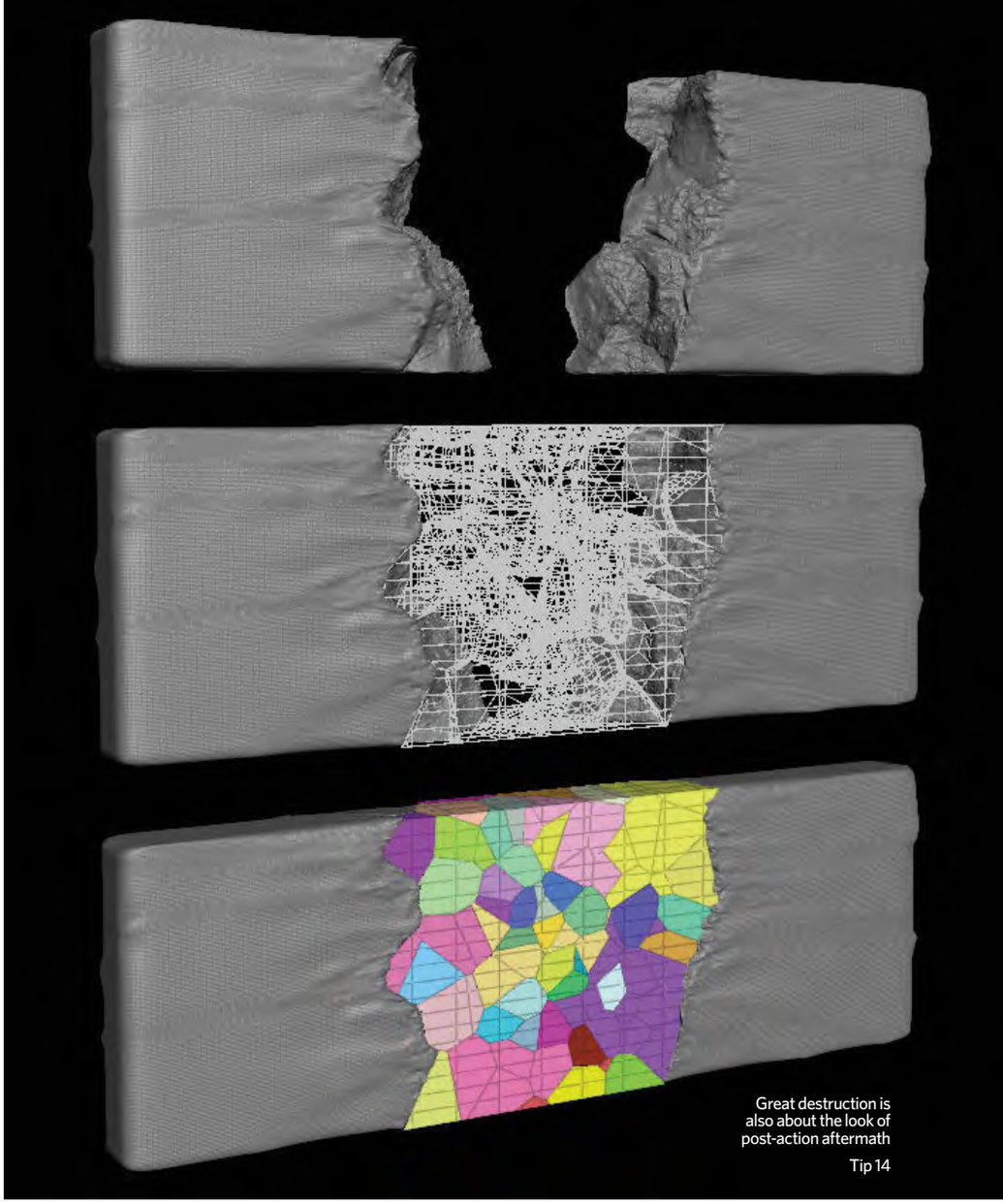
12 Create a proxy guide for your hi-res work Have the model that you want to simulate in high and low resolution so that you can start working on the low-resolution model until you achieve the correct FX behaviour desired. **Manuel Perez Sanz**

13 Circumvent your hardware limitations BulletSOP is a very good plugin for Houdini; it allows you to create incredibly large rigid body simulations, even if you are working on your project on an average PC. **Manuel Perez Sanz**

14 Sometimes you have to start from the end Save time and resources by starting from an approved destruction aftermath and then just focus on shattering and destruction where it's actually needed. **Zeljko Barcan**

15 Have multiple layers You should layer up your fluids, dust, debris and particles. The more that you break up your simulation and render into layers, the better. With destruction, you can almost never have too much stuff going on at once. **Tom Rowell**

16 Meaningful object separation during shattering Shatter only what needs to be shattered. Make use of Partition and Connectivity SOPs in Houdini to automatically group primitives. Select what the fracturing will affect or not. Afterwards merge everything and pack the RBDs. **Rainer Duda**



Great destruction is also about the look of post-action aftermath

Tip 14

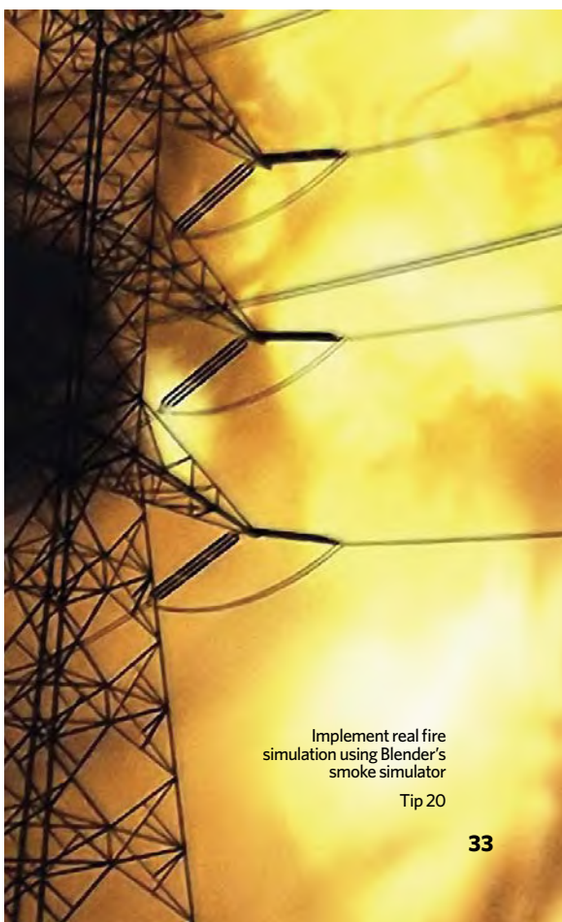
ANIMATION

17 Hero VFX can be animated Don't be afraid to hand animate hero parts of destruction and debris, especially if it needs to be specifically directed. **Nicholas Pliatsikas**

18 Use localised forces to emphasise the destruction Add torque, fans and directional forces to add some extra Hollywood sauce. This can add variety and character to your sims. **Nicholas Pliatsikas**

19 Add smaller secondary simulations to large-scale destruction When running destruction in large scale for films like *Godzilla*, we found it useful to supplement our complex simulations with simpler, but more controllable particle or rigid body simulations. **Rob Hopper**

20 Flames with smoke simulator Everybody knows in movies there is no explosion without a huge fireball. What everybody doesn't



Implement real fire simulation using Blender's smoke simulator

Tip 20

know is that Blender's smoke simulator can simulate the combustion of fuel. **Kai Kostack**

21 Particle-driven explosions When using FumeFX to create explosions, we often use particles to drive the simulation. You can also use Thinking Particles and a smoke particle simulation to drive the final FumeFX simulation. **Joe Gunn**

22 Layer in stock footage Use stock footage to help blend the CG that has been generated into your backplates. They can add realism and are easy to experiment with too. **Nicholas Pliatsikas**

23 Creative Voronoi techniques Use deformations on your Voronoi shatter patterns to create shapes that adapt to the curvature of the objects and help you fake impact stress and compression. **Zeljko Barcan**

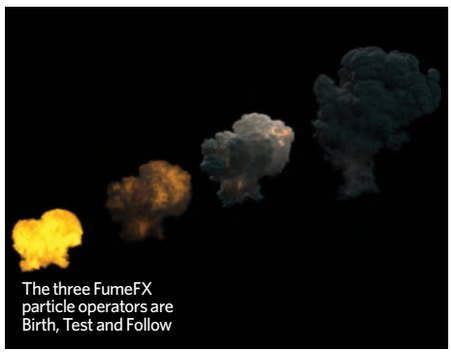
24 Close-up destruction In a *Terminator Genisys* sequence where a T-800 endoskeleton fights Reese, to avoid the triangular shape characteristic of our final element destruction plugin (Kali), I optimised the tetrahedral distribution as much as possible. **Luca Vitali**

25 Create interesting fracture shapes Voronoi fracturing creates, by default, a uniform set of debris. To create interesting shapes use the Voronoi Fracture Points SOP attributes to define your own densities around special areas. **Rainer Duda**

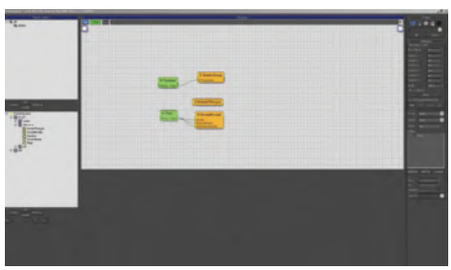
CONTROL YOUR VORONOI FRACTURE STYLE

with Nicholas Pliatsikas

In Houdini, the points used for the Voronoi Fracture input are the bread and butter of that system. Experiment with different types of point inputs to change how the fractures look. Scattering points on the surface of your mesh creates fractures that grow towards the localised centre of the mesh. While scattering points inside the mesh gives a more granular cell structure, you can also try combining in different densities. To create directional fractures, scatter points on a single side of your object. If possible you can try to use the mesh's normal direction to help. Play with scatter densities and the clusters of the fractures, particularly if you have clear points of impact. Try to achieve high-density points around the impact zone with lower densities falling off from that area. Small spheres of dense points placed at the point of impact can also help you to generate those radial-style fractures that can be seen in anything with damage from a bullet hole.



The three FumeFX particle operators are Birth, Test and Follow



BLENDER FRACTURE MODIFIER

with Kai Kostack

For Blender users, the fracture modifier makes dealing with complex geometry easy as it doesn't require meshes to be manifold or prepared. It supports standard algorithms like Voronoi cells but also methods like fractal Boolean bisecting for creating rougher edges. The modifier is fast when it comes to mesh separation and as it treats the entire structure as one object, it isn't limited by the object count weakness of Blender which usually decreases performance on large simulations. While it is an incredible tool for artists working on destructions, it requires the user to keep two Blender versions installed (**bit.ly/1PdGNpL**).

Terminator Genisys still courtesy of MPC

Tip 24

OVERCLOCKERS UK
www.overclockers.co.uk

RENDA

PROFESSIONAL WORKSTATIONS

5 YEAR WARRANTY • BUILT & STRESS TESTED • CONFIGURABLE • ENGINEERED BY THE EXPERTS

RENDA PW-E7F

FREQUENCY ENHANCED, LIQUID-COOLED WORKSTATION

The Renda PW Series provide a flexible, powerful liquid-cooled workstation solution - designed around the Intel X99 chipset.

With finely tuned hardware, and vast customisation options, you can tailor your Renda machine to suit your needs.

- Intel® Core™ i7 5820K @ 4.3GHz (Upgradable to 5930K @ 4.2GHz)
- Asus Z99-E WS EATX Motherboard
- Up to 3 x NVIDIA Quadro or AMD Firepro Series Graphics
- Up to 64GB DDR4 2133MHz Memory
- Configurable SSD & HDD storage
- Five year warranty as standard

Prices from
£2024.94 inc. VAT

explore renda

Renda M-H5F & M-H7F

Compact design with flexible customisation, without power limitations.

Renda M-H5F & M-H7F

Mid-tower build with optional frequency enhancement for increased performance.

Renda T-E7 & T-X3

Up to 16 core Xeon processing power with dual graphics card support options.

Renda P-E7, P-X3 & P-X6

Up to dual Xeon and triple graphics card support for huge performance when you need it.

Built for Pros with Intel Inside®

www.overclockers.co.uk/renda

Overclockers UK | Unit 5 Lymedale Cross, Newcastle-under-Lyme, Staffordshire, ST5 9BT

Prices correct at time of print but may change without prior notice. All items subject to availability. Specification may vary.
Intel, the Intel Logo, Intel Inside, Intel Core, and Core Inside are trademarks of Intel Corporation in the U.S. and/or other countries.

intel® inside™ CORE™ i7

The Pipeline

Expert advice from industry professionals, taking you from concept to completion
All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

"We'll focus on setting up the model for FiberMesh and explain a few techniques for getting some control over the creation of fibres"

Render a furry creature concept

Create a unique character design and build fur using ZBrush

PABLO MUÑOZ GÓMEZ
The Wanderer, 2015

Software

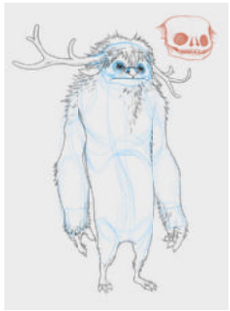
ZBrush, Photoshop

Learn how to

- Design with a story
- Explore silhouettes in ZBrush
- Tweak character proportions with ZSpheres layers
- Polypaint for FiberMesh
- Edit and groom FiberMesh
- Set up fur for a full-body character
- Group FiberMesh for more control over the grooming
- Pose the character
- Render multiple passes and combine them in Photoshop

Concept

This creature is catalogued as one of the most social subspecies of the Lost Creatures. However, their interaction is restricted to other species as they are hostile to individuals of the same group.



YOUR FREE DOWNLOADS from **filesilo.co.uk/3dartist**

- Tutorial screenshots
- Video tutorial

In this project we are going to explore the workflow and method used to create a Lost Creature. We will be making this creature to help us make a central character as part of an illustration. This is an imaginary Lost Creature wandering the wild. The idea was to capture a moment in the life of this furry character, showing his curious and friendly side.

One of the most challenging things about designing this, and any other character, is to make it appealing, memorable and believable. As we sculpt this creature, we'll make aesthetic decisions to give personality to our character.

Based on a rough 2D sketch and using ZSpheres, we'll quickly build a versatile base model of the creature. This will enable us to refine the character's silhouette and proportions using layers. We'll focus on setting up the model for FiberMesh and explain a few techniques for getting some control over the creation and grooming of the fibres.

Along with a series of sculpting tips, you'll learn to tweak and groom different groups of fibres to further help you explore the design through the way the hair is shaped and placed on the model.

ZBrush will be the primary software used in this tutorial for the concept, sculpting, texturing and rendering. We'll also use a bit of Photoshop for the initial sketches as well as for the final composition.

01 Design with a story Regardless of the nature of your project, it is always important to gather references to help you visualise the idea. These references could also inspire you to develop the story behind your character, or they might suggest the imaginary world that the character lives in. This Lost Creature doesn't have a narrative or a story behind it, but you can create 'facts' about the species or clan, for instance. These facts could help you narrow down some design elements to make it a believable character, for example we can say that this is 'a social creature, but it's hostile to individuals of the same group, innocent, gullible and easily distracted'.

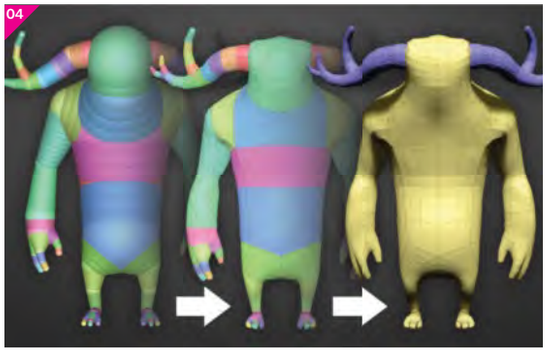
02 Iteration and the exploration of ideas Some initial sketches will help you visualise a bit better, whether you want to pursue the original idea or not. Let's start by drawing a few thumbnails to capture the main elements that you want to include, for example: big heavy horns probably place the creature high in the social hierarchy and suggests a certain age. Long arms and short legs suggests that he is not very fast, and he is slightly hunched over due to the weight of his horns. You could also do a collage with the references you collected to help you lock the forms, materials, transitions and so on.

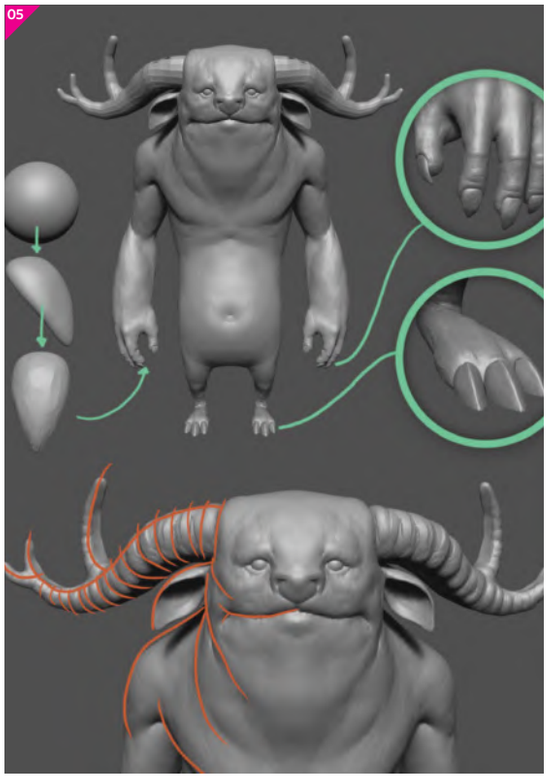
Fine-tuning silhouettes with layers

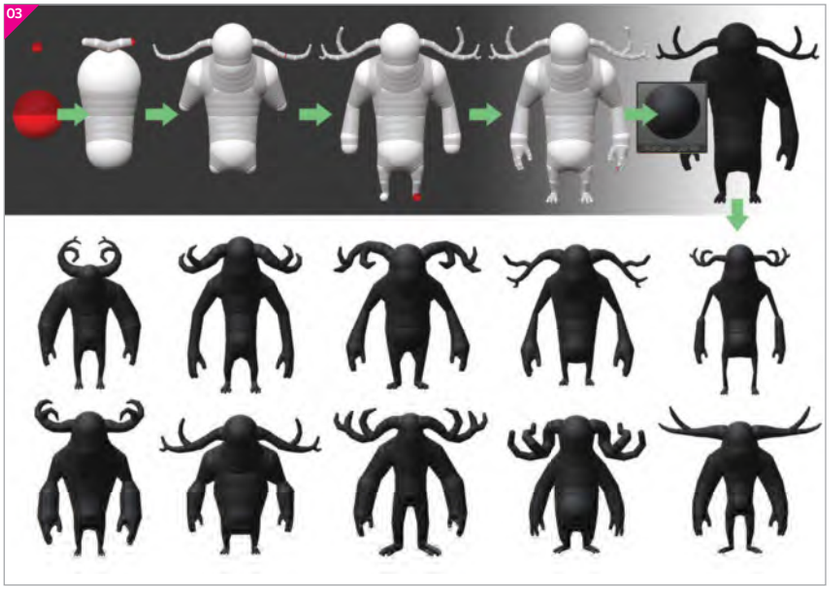
An interesting way to explore the proportions of the character and the overall shape of it is to use ZSpheres with layers. You could start by creating a fairly average armature (by turning symmetry on). Then add a new layer in the same way you would for any subtool. Start rotating the limbs and scaling the ZSpheres until you're happy with the new silhouette. Add a new layer for a new idea and keep exploring shapes. Once you have a few variations, go to the layers subpalette and start playing with the sliders to blend the variations in order to get even more options.

03 Ground your design Once you have created a few thumbnails and sketches, open up ZBrush to continue the design process. One of the advantages of designing within ZBrush or any 3D application is that you can quickly evaluate your design from every angle, so we'll use ZBrush ZSpheres to play with the character's proportions. A quick armature done with ZSpheres and a dark MatCap can help you to easily create numerous variations of the character's silhouette by rotating, scaling and moving the spheres. You can also make use of Shift+S to drop copies on the canvas and save a document with all of your silhouettes.

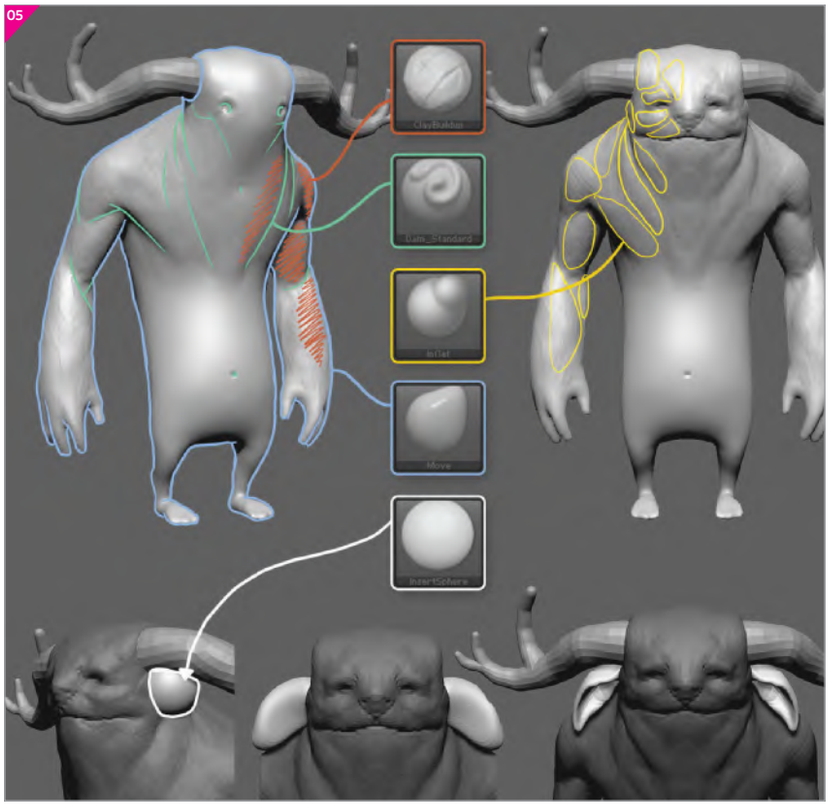
04 From armature to 3D sketch Next step is to choose one of the armature's silhouettes to work on. Nothing is set in stone, but at this point it would be good to add a bit of structure to the design to build a solid base for the character. With the chosen armature, create an adaptive skin (one for the body and one for the horns) and DynaMesh them. Try limiting yourself to only using the Move brush for now to break some of the obvious spherical volumes from the adaptive skin. The Topology Move brush is also very handy in areas such as the fingers or where the arm gets closer to the chest.



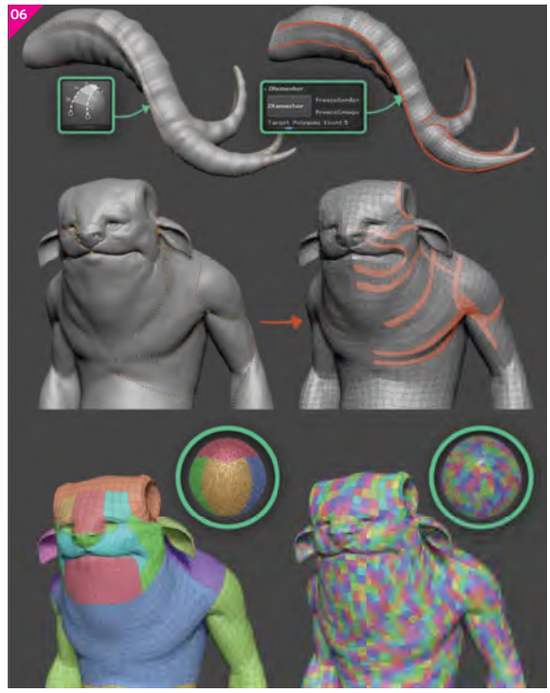


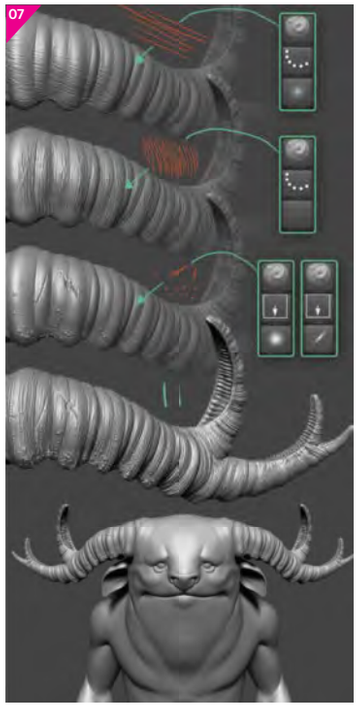


05 Refine in low resolution and add details Since most of this character is going to be covered by fur, we need to exaggerate some volumes to avoid losing the desired contour when we add the fibres. A combination of ClayBuildup, Inflate and Smooth is ideal for this part of the process. Try to avoid doing too many details at this stage and keep the size of the brush large, this will let you focus on large areas and block out a nice character profile. You can also use Dam_Standard to roughly mark some key areas of the model like the eyes, nose and mouth or any other anatomy landmarks. Now we will actually work on the details: add the character's eyes and claws by appending spheres and shaping them, and then go over the model and refine the forms. Keep in mind that most areas will be covered by fur, so concentrate on the parts of the body that are going to be exposed such as the eyes, nose and – especially – the horns. If you think about your model as a composition, you can follow certain principles that could make your design stand out – contrast, lines of actions, balance and so on. In this case, the horns are a vital design element in this character's composition, so they need special attention.



06 Grouping This is a key step when using FiberMesh, not only because it gives us control over the hair creation but also the grooming. We'll use the ZRemesherGuides brush to draw a few guidelines that ZRemesher will use to arrange the polygons and build a cleaner model. When the retopology process is done, duplicate the new model. We'll subdivide and group one mesh to project the details from the sketch, and the other one to group each polygon individually. When each polygon on the model has its own group, the fibres created will maintain the grouping, giving you more control once you start stylising the hair.

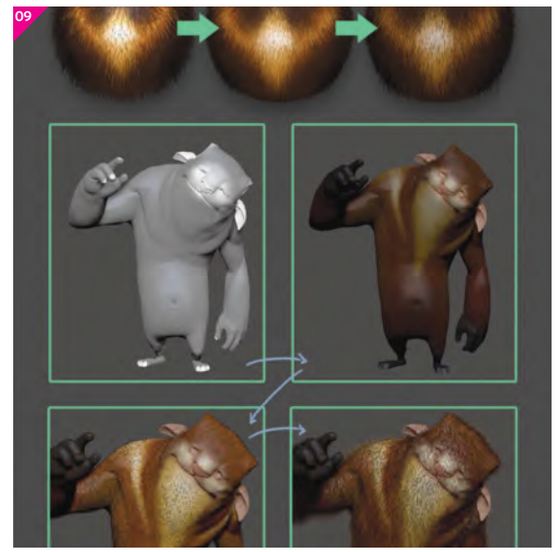




07 Polish and Polypaint At this point the setup of the model is complete, so it's time to polish the surfaces and add some extra details. By using layers, you can create intricate effects and have full control over the contribution of the details of each layer. Take the horns for instance; in one layer we've sculpted deep vertical crevices and in the second layer we have horizontal indentations that run from the base to the tip. Using the layer weight sliders, you can blend the effect for each set of details to create a balanced pattern. You could use alphas to add further details like bumps and wrinkles where the hair won't grow. Use colour to reinforce your design, to guide the viewer, or simply, to frame a point of interest. The Polypaint on this creature is almost a gradient that goes from yellow to black, creating a vignette effect and adding focus to the face. FiberMesh can grow the hair with colour using Base Colorize. At a value of one, ZBrush will sample the Polypaint information from the model to tint the fibres. This will give you greater control and the result will look far more interesting. Keep in mind that the fibres will create the effect of blurring the transition between different colours, especially for messy hair.

08 Add character with the pose Posing a character is another powerful opportunity to reinforce its personality. Take advantage of the original armature to quickly try out some poses, so you can get something that expresses exactly what you want. In this case the final pose is rather simple, but it helps to portray the innocence and curiosity of the creature. Since we have multiple tools, the Transpose Master plugin would be the obvious choice and because of the manual grouping we did earlier on, you can mask or hide areas quickly. Also, consider how the shapes and volumes can help you with the composition.

09 FiberMesh first pass In most cases, you'll fneed a large amount of fibres to achieve the desired effect. A good idea is to generate some fibres from a simple sphere, and tweak the settings until you are happy with how they look. Then you can save the settings and use them in the posed model but with a higher number of fibres. For the first pass, mask everything except the areas that won't have hair and preview the fibres with your saved settings. This first pass should cover the entire body and have the hair spread evenly.

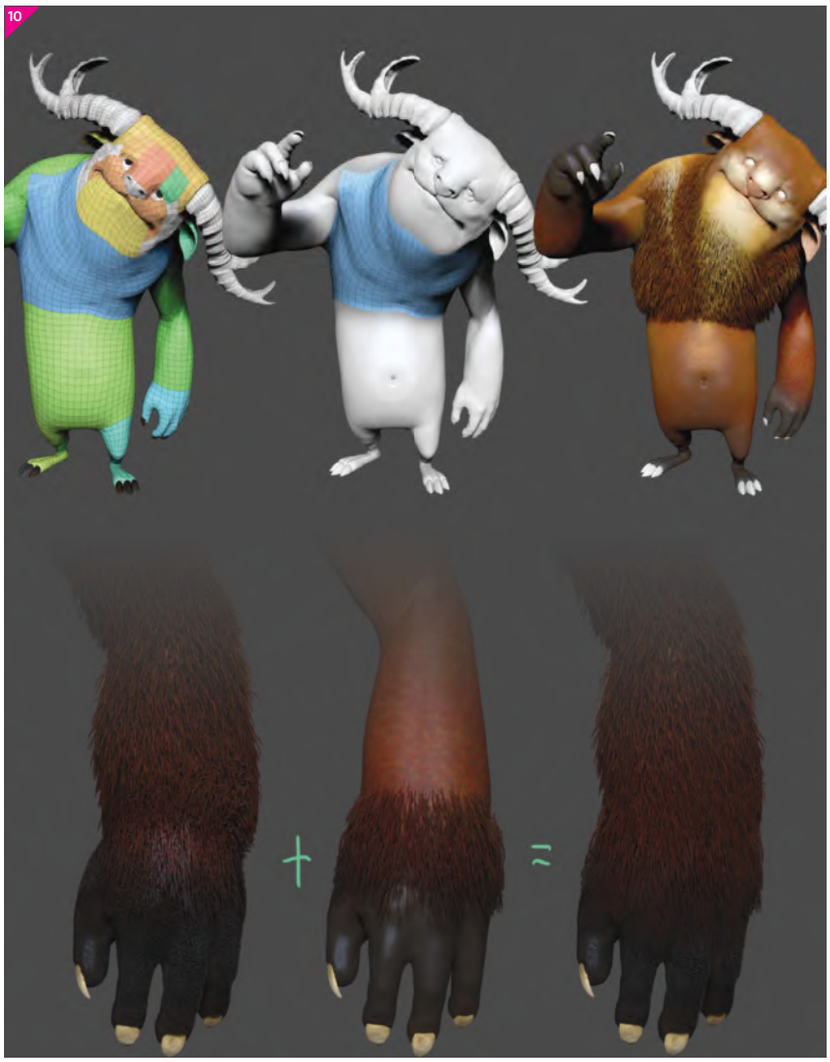


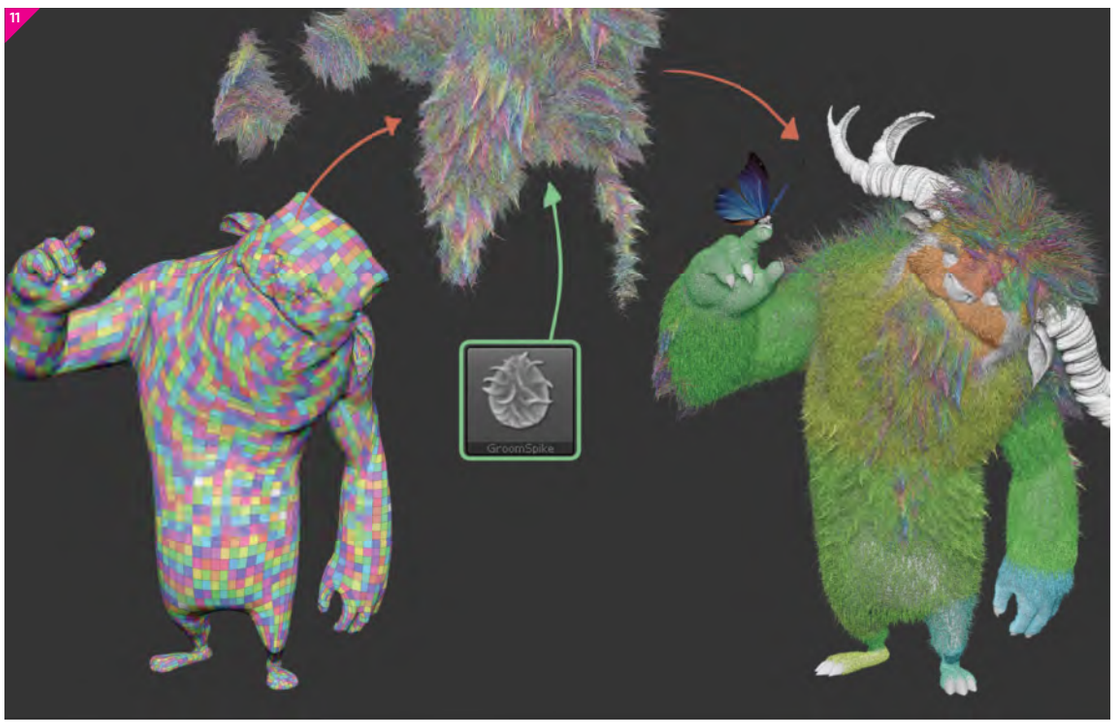
10 FibreMesh blocking The second pass consists of using the grouped areas to separately grow blocks of fur. Start with big groups like the chest and back to set the maximum number of fibres, as you move to smaller groups gradually reduce the number of fibres to keep the hair amount consistent across the character. In some areas the difference in hair length is quite obvious. For example, the short hair on the hand is next to the longer hair of the forearm; we'll need to create a transition from long to short by masking the wrist region and tweaking FibreMesh for a more gradual change.

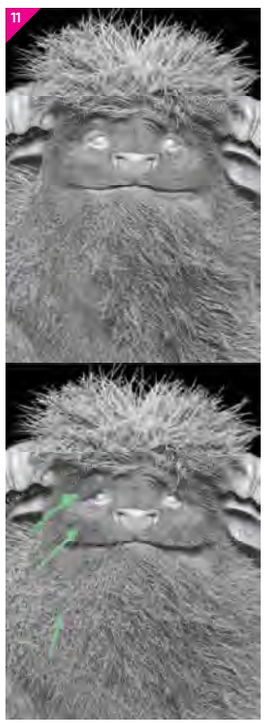
11 Extra fibres and retouching the hairstyle For the third pass we'll use the copied model we created earlier. Mask areas where you want slightly longer hair and create the fibres, press Shift+F and you'll see that each polygon produces a grouped set of hair. Select GroomSpike and turn 'Mask By Polygroup' to 100, this way you will affect only the fibres that share the same group, making it easy to create clumpy spikes of long hair. Remember that FiberMesh previews are very different from the render so try to do quick BPRs to make sure all fibres are looking good, especially after grooming. The Move tool is great for editing FiberMesh: use it to reposition chunks of hair or to push some hair inside the model to hide them (this is useful around the mouth or the eyes). Be careful when using the Smooth brush because it could make the fibres too thin.

AutoGroup by normals

With a low-res version of your model, assign a different polygroup to each polygon. The advantage of this is that FiberMesh will assign groups to fibres created based on the underlying surface. Each polygon will produce a unique group of fibres. You can use any Grooming brush with 'Mask by Polygroup' at a value of 100 to control fibre groups individually. Group quickly by using 'Group By Normals' with a 'Maximum Angle Tolerance' of 1.

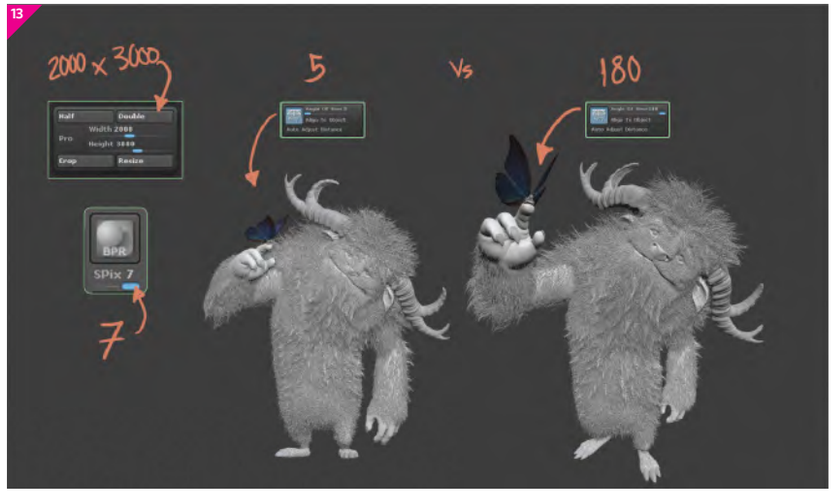






12 Materials and lighting We are going to keep the materials for the render quite simple and just render a couple of extra passes with MatCaps. The body, horns and fibres have slightly different versions of SkinShade4 with variations in the specular value and the wax strength. The lighting is a three-point setup with a key, a rim and a fill light. You can create a LightCap but in this case three lights would make the process of rendering passes much easier since we can quickly toggle the visibility and influence of each light.

13 Document, quality and camera While sculpting, a small canvas document is more efficient and ideal for testing the render passes. To set up the document for the final render, though, we need to set the right dimensions and increase the size. The next step is to frame the model roughly to where you want it and tweak the 'Angle of View', this will flatten or exaggerate the perspective. We'll use ZAppLink to store the render view – this is an essential step in case you accidentally rotate the model. Finally, increase the antialiasing quality by changing the SPix (SubPixel) to a value of seven.



14 Render passes With the document ready, we'll start generating the render passes. Sometimes it might be difficult to decide which passes to render, so start with the basics and if you need more, go back to ZBrush and create new renders. The basic passes will vary depending on what style or type of illustration you are after; for this creature we need at least a beauty, shadow, mask and depth pass. Additionally, we'll render an AO pass, reflection pass (MatCap Satin01) and flat colour pass (Flat Color). Finally, we will turn all Polypaint off and render each light individually with shadows.

> "It might be difficult to decide which passes to render, so start with the basics and if you need more, go back to ZBrush and create new renders"

Colour FiberMesh

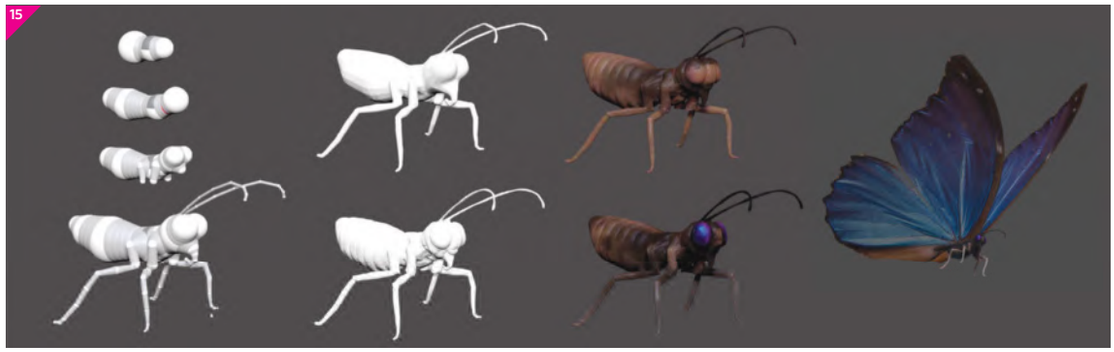
An alternative way of adding colour to the fibres is to manually Polypaint them. You can also use this technique to further tweak the colours of fibres already created. Turn ZAdd off and Rgb on, and by using the Standard brush with the 'Mask By FiberMesh' feature in the masking options, you can paint portions of each fibre.

15 Point of interest The butterfly was something that came up while posing the character to add an additional point of interest and as an element to support the action suggested by the pose. Creating the butterfly is quite simple and similar to how the creature was built: we started with a ZSpheres armature and created an adaptive skin to sculpt some details, then we added Polypaint layers to the body. The wings are planes with UVs using an image texture of a wing on a black background that, if enabled, ZBrush interprets as transparency. Then you can use Transpose Master to position the butterfly.

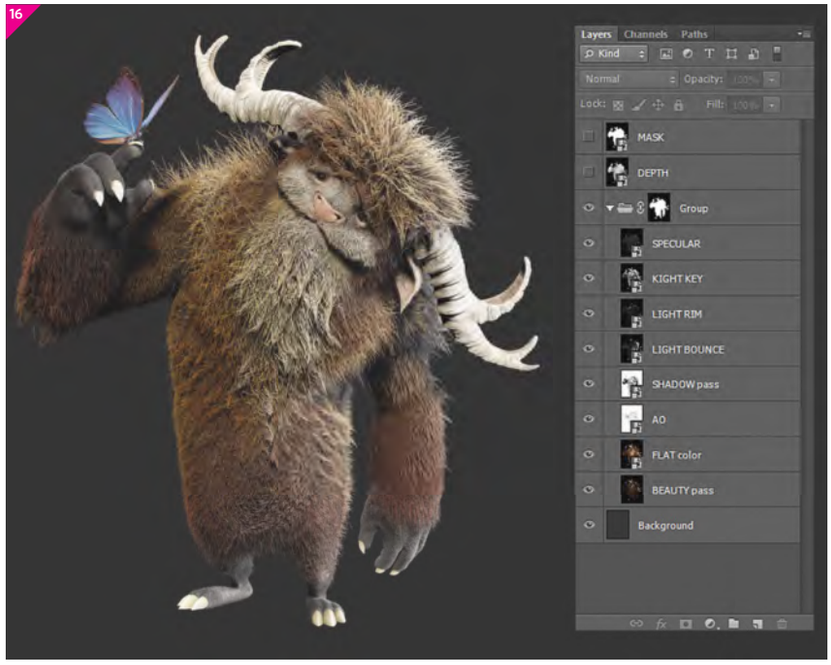
16 Composite To combine the different passes, use Photoshop. Import your passes and name them, we'll put the depth pass and mask at the top of the Layers stack and hide them. The rest of the render passes can be added to one group, and we can mask the whole group with the mask render pass so that we are able to see the background. With the beauty or colour pass at the bottom, change the Blending Mode of the shadows and the AO to multiply and tweak the opacity. For the light passes, change the Blending Mode to Screen or Add, or use them as masks for new layers to have full control over the colour and intensity of each light.

17 Final tweaks Use the Adjustment layers in Photoshop for a nondestructive way to edit a layer. Create level adjustments and place it at the top of the rim light pass; holding Opt/Alt, click in-between the two layers to clip the effect to that single layer. Now you can adjust the contrast and intensity without affecting the original pass. To add a photographic effect, use depth pass as a mask and add a lens blur for a depth-of-field effect.

15



16



> "Creating the butterfly is quite simple and similar to how the creature was built: we started with a ZSpheres armature and created an adaptive skin to sculpt some details, then we added Polypaint layers to the body"

Quick mask compositing

Masking is the backbone of compositing, so creating good masks will give you greater control over the effects and the compositing process. There is a quick way to create render masks in ZBrush though. First of all, turn off the Polypaint on all of your subtools, then open the Materials Modifiers palette (with the SkinShade4) and change the value of Ambient to 100 and the Specular value to 0. Now choose black for the main colour and simply fill any subtool that you want to create a mask for in white. Then hit render.

17

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

The RenderCube® Family

Accelerate Your 3D Renderings And Projects

The RenderCubes are preconfigured for most renderers such as Autodesk® 3ds Max®, Autodesk® Maya®, Mental Ray®, V-Ray®, Cinema 4D® Team Render, Blender™, Octane®, Arnold® and many more.

Vist the Renderfarm Guide to learn more: **www.rendercube.eu**

CADnetwork®

Premium. Performance. Innovation.

All company and product names are trademarks or registered trademarks of the respective owners.

> [We] took today's interest in drones and overlaid that with a craft that might need to be unmanned but accurate in application

Model and render a submersible drone

Extrapolate and develop interesting details from the render context and the conceptual stage for a unique aircraft model

COLIE WERTZ
Time To Dive, 2015

Software

Maya, ZBrush, MARI, Photoshop, KeyShot

Learn how to

- Explore an idea using contextual information from the past and present
- Begin fleshing the idea out in sketch or model form
- Take your model in a direction for painting and lighting
- Composite your renders with a background to make a final image that shows your design in its intended environment

Concept

I was wondering about old WWII designs that were never fully documented, or failed. There were plenty of interesting wartime craft and weapons. I took today's interest in drones and overlaid that with a craft that might need to be unmanned but accurate in application, as well as a potentially aesthetically interesting design problem. The sub drone is that result!

YOUR FREE DOWNLOADS
from **filesilo.co.uk/3dartist**

- Reference photos
- Tutorial screenshots

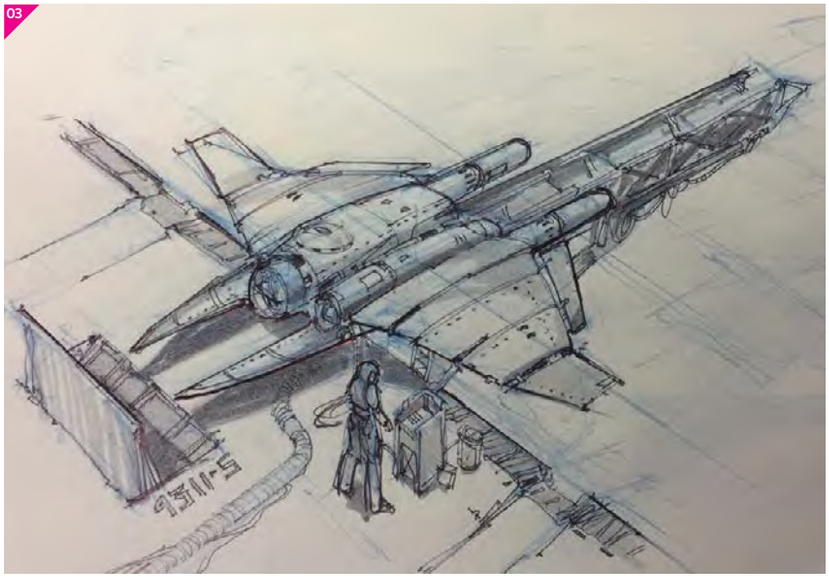
This tutorial will give you insight into the process of taking an idea from a budding idea to a finished, painted concept model. You will also be shown where to refine ideas within a model/idea by researching contextual information available to us on the subject. This contextual information is anything that makes your idea, and ultimately your presentation, more believable.

As we go through this tutorial, we'll be exposing moments where we learned more about a particular reference or visual subject along the way. This remains, for us, the most important aspect of the design process. This means that the rule of form follows function takes precedence. By taking a closer look at many of the things around you in the world, it's possible to extrapolate future and past contexts to strengthen your final product! For this tutorial, we'll go through the design and execution process of developing a German sub drone from World War Two.

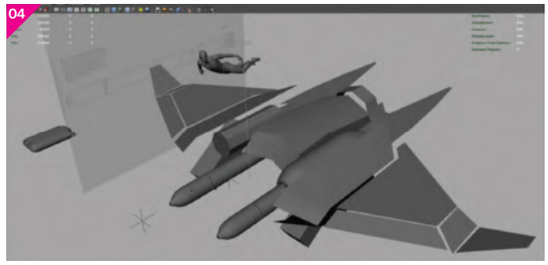
01 Open your mind This portion of the process can be the most fun. Use a number of tools to get your thought process started. The first is simply allowing yourself to be inspired. This sounds fundamental, but try to get in a headspace where you can be more receptive to things around you. For us, it usually starts by getting in a car and looking at how much stuff has been designed for the interior and what their functions are. From there we can imagine cars 50 years ago and the demands on them compared to the demands today. Bluetooth just wasn't necessary, for example, as it just didn't exist. Now it's the first thing needed in a modern car. What will the first thing needed ten years from now be? This approach can be applied all day, every day. It's a rich world. By the time we're into our first cup of coffee, we're already feeling around some shapes in the sketchbook. We don't have anything in particular, and that's okay!

02 Develop a brief and weapons of choice You need to have some inkling of what you're going to develop. It could be one word, or a paragraph or simply a shape you see and want to explore. Often when doing paid work, briefs are typically given to you and that narrows down a lot of the flailing when you're just trying to come up with something cool. The manta shape drove our initial sketch. There's a smaller sub drone in the image sketched with its wings flapping, maybe for propulsion or maybe for axial manoeuvring – showing that even at an early stage, with only a few lines, we were thinking dynamically no matter if we used a smaller sub drone in the final render or not. We prefer getting rolling with a Moleskine sketchbook, a little Tom Binh bag that holds it, an iPad and a Microsoft Surface Pro 3. It's our little arsenal for purging and developing. We also have a Dropbox account that lets us look over images whenever we want.

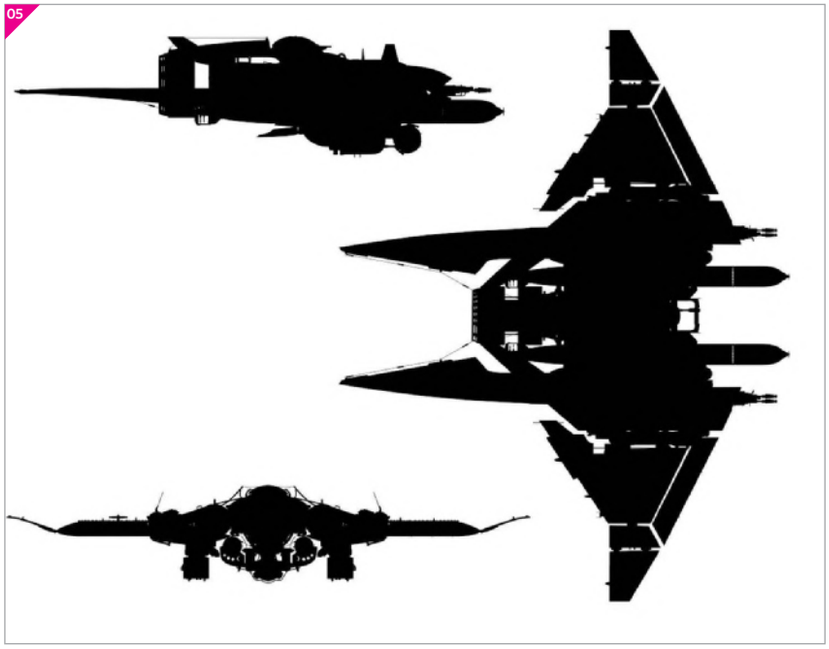
03 Start sketching For the sub drone we drew a square diagonally and started cutting it up. So we had an inkling of what we might be going for at this stage. The manta shape started to show itself, and we went from there. The assignment was to develop a mech for a book; we allowed (and this is key) our sketching and that assignment to overlap. The brief, as mentioned previously, was bleeding and forming itself the more it was sketched. Be present for this occurrence. It can change your game and alleviate a lot of design-block anxiety that can come later on! Don't feel handcuffed by the word 'sketch' either. If you sketch in your modeller, do it. It's all about having a clear mode of communication from your head to the medium you choose. Once you sketch something, usually in a top view for easier 3D understanding, challenge yourself to sketch it again. This puts you in a 'I'm committing' frame of mind, and a little light goes off in your head that tells you that what you're doing is carrying more worth than just a simple doodle. Things will change, and the idea begins to form of what we think of as a directory structure: form, function, context, materials, history and users.

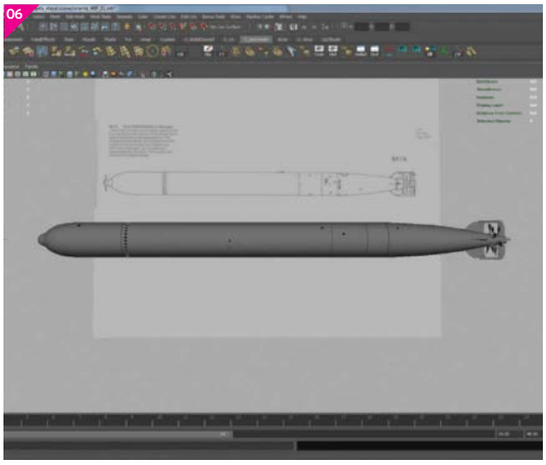


04 Eliminate the lies with a good model The 3D modelling stage takes a lot of pressure off your sketch. You can sketch cool stuff all day, but if they don't work in the round, you will be chasing notions of something not looking right all day long. There are definitely some people out there in design-land who can draw nearly perfect 3D images in form, well we're not one of them! Your modeller of choice can get you into a more comfortable area in your design process. For the sub drone, we opened Maya and made a few planes. By jerking some points around and adjusting those proportions, we had a little plan of the sub. The simple shading in a modeller will allow you to move those same points around and establish some interest in all three dimensions, and that's important.



05 Silhouettes rule A good design will look good in plan, front and side elevation. As you get a feel for your primary shape and form, which for us was sticking to the manta silhouette, begin thinking about what can add interest to your silhouettes. This is where your reference library can come into play. For this project the barbs on a manta's head, which gives it the 'devil ray' name, are pretty significant in the ray's silhouette and had to be in the design. We decided that the barbs would be torpedoes so the design now had a foothold.



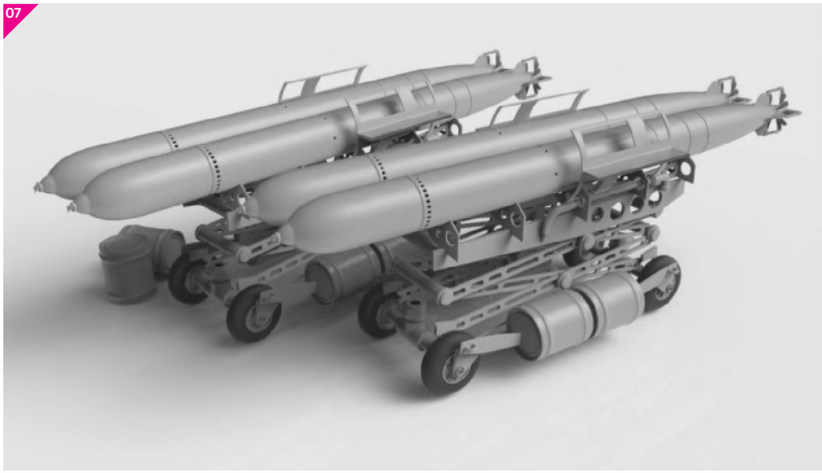


> "Once you sketch something, usually in a top view for easier 3D understanding, challenge yourself to sketch it again"

06 Nail the scale Having decided that the torpedo was going to be a known quantity, we searched for a period-appropriate model used by the navy at a particular time in history. A little reading later, we found a few models of torpedoes that made some sense and could serve as the backbone of the design's scale and historical reference in object form. This is a massively important point, as we're now committed to a form and a time for the design to be rooted in. We made an underlay of the torpedo and built it in Maya. We kept the Maya models at a one unit to one centimetre scale, as V-Ray likes that for its real-world lighting accuracy. While we weren't committed to a renderer, we liked knowing it could be used there. It was a relaxing build, as we knew that the viewer would see it and think, 'oh! I know what that is!'.

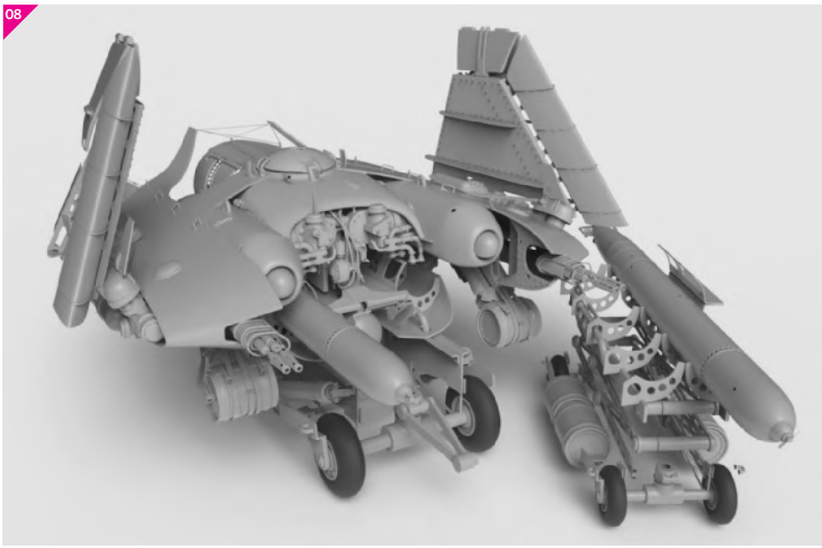
07 **Rabbit holes** As we did research on the torpedo, we went down a few rabbit holes of other information that we found interesting on the subject. Allow yourself this luxury! It's all relevant, and you're loading your palette of reference: both visual and factual. Some things we hit were torpedo tubes, torpedo storage, torpedoes being mounted on aircraft, depth charges and a few other technical tidbits that gave us an inclination on how these antiquated weapons were deployed and tracked targets. The sub drone would be used as a short-range taxi for depth charges and torpedoes, shuttling the armaments to deploy to targets at close range. They're manoeuvrable, hard to track, and would be great for minefield navigation if a ship decided it was too dangerous to try and pass. Since the sub drone carried no human cargo, it could ram the target if need be. It's a bit like a Zero, only from the Luftwaffe. We imagined the guidance systems on torpedoes would be developed further and applied to these drones. The whole design for the sub drone wasn't complete, but it was getting more and more rooted. We had a real direction and could start developing around the torpedo model.

07



08 **Build with educated purpose** With the establishment of a history and place where your design would exist, you can sketch out scenarios that would give your vehicle/character more believability. In this story, the sub drone would need to be launched, cruise, splash down, navigate and deploy. For the launch, we chose a Messerschmitt Me 262 engine pair that would have been used by the Germans since that was their first jet aircraft, and this would be built about the same time. These engines would be smaller than those on the aircraft, but of the same design so we got orthographic underlays from Google, put them into Maya and built them. We made the size work with the pre-established scale and proportions. There'd need to be a propeller/screw for the aquatic part of the mission, so we did research on the dive planes and screws of subs. There was a great palette of parts from the past that we could use for the form and function whilst adhering to the aesthetics, too. The fairings and wings would allow the sub drones to be stored on ships for deployment, as they folded to save space.

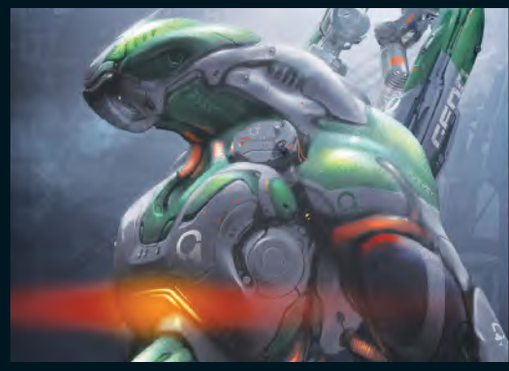
08



Showcase

Colie Wertz

Colie is a visual effects professional currently working on projects ranging from ship concept design and sketches to production-ready assets for film. He has been in the industry for 20 years and is enjoying smashing together techniques in both 2D and 3D art to create more believable and pipeline-friendly concepts. He lives in San Francisco, California.



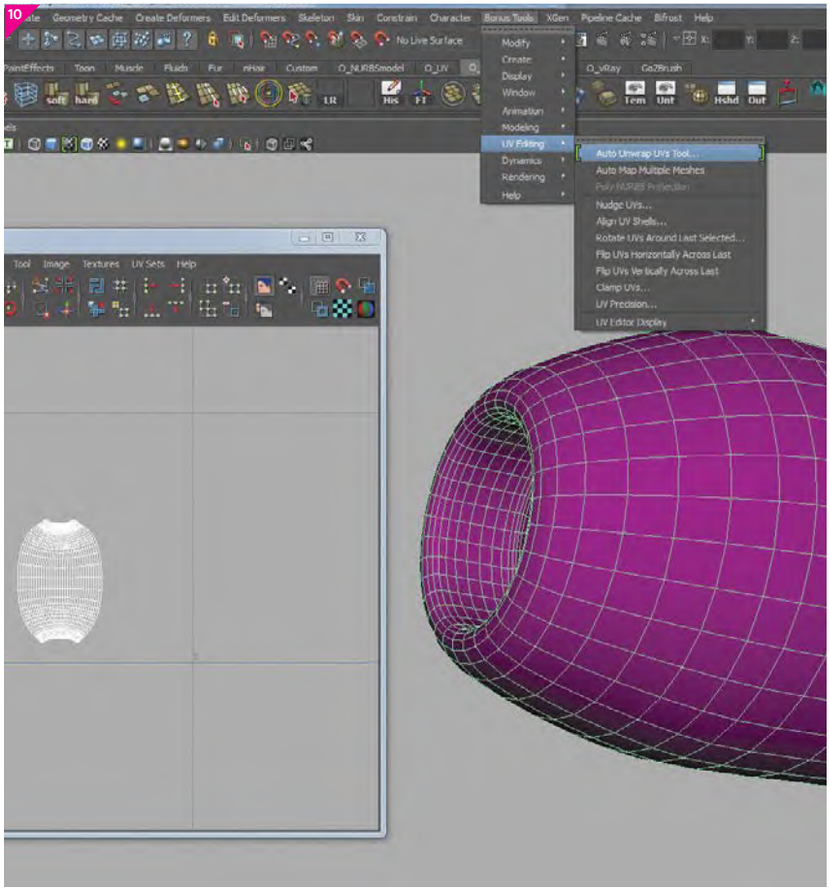
Genosuit **Maya, Procreate (2013)**
This is an exosuit for use in zones where biowarfare has played a role. This image started out as a sketch in the Procreate app on the iPad, was augmented in Maya, then sent back to the iPad for finishing.

Jai-alai robot **Maya, V-Ray, MARI, Photoshop (2013)**
Originating in Spain, Jai-alai is a robot that found its way to Miami, Florida then disappeared, resurfacing in an underground gambling circle in Shanghai.

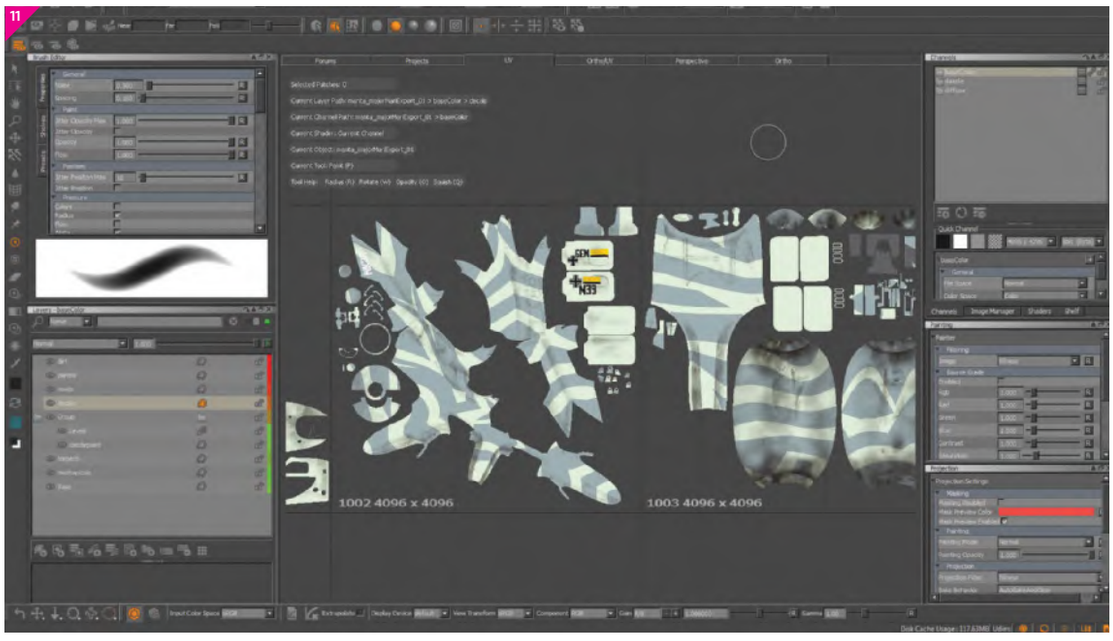
Lander **Procreate (2015)**
I'm discovering that I can get a lot of ideas almost anywhere. I have a sketchbook and pencils I carry around with my iPad with Procreate on it.

09 Pick an environment It is imperative that a lighting environment be established as early as possible in your design if you're working toward a deliverable of either a still or animation. Light shows off your model, and how that light can best show your model off is easier than ever. Maya's Viewport 2.0 is good, but we prefer Luxion's KeyShot. A smoothed OBJ file is all you need to inform you of how you can detail your design and determine depths of details as well as shapes of fairings. We modified a few of the outdoor images that come standard with KeyShot, making them less saturated for drama. You can save these modified versions in KeyShot for future use!

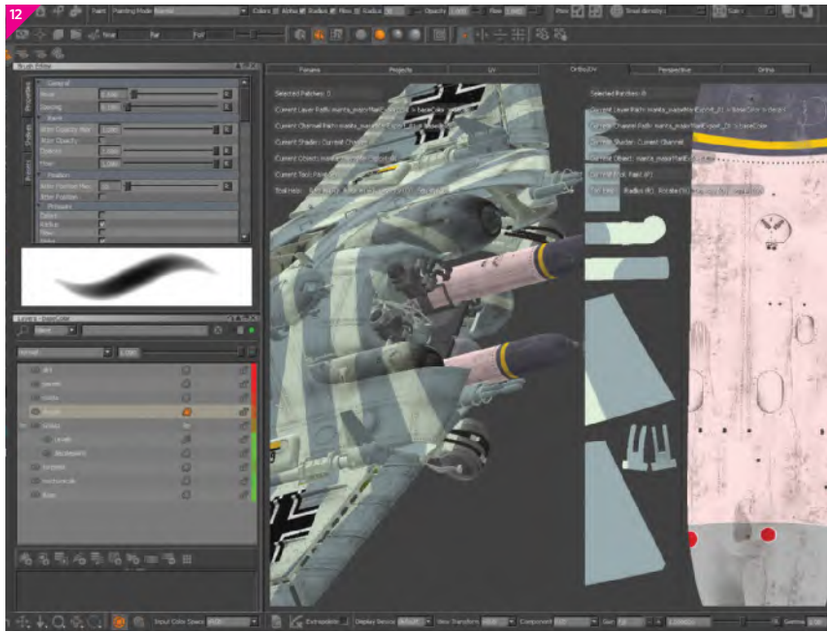
10 UV maps We used Maya and ZBrush for UVs. Maya's UV tools in the 2015 version are great. You can enter a live UV scenario where you pick edges, separate and see what you get in the UV editor, then change your cuts to better serve your purpose in paint. This is a painless alternative to the past. That said, with MARI it doesn't really matter. We tend to ship baked, smoothed parts over to ZBrush, run a UV unwrapper, and call it a day. We like doing this as it shows how accurate and fast it is. It's literally a button – UVing is too much work when you're trying to stay in the flow.



11 UDIMs rule Line up your UVs in a row of tiles: 0-1, 1-2, 2-3 and so on. This will allow you to see all of your maps in the editor and their corresponding parts. Back in the day you could stack them all in 0-1 space – don't do that. If you ever decide to go to MARI, it won't work. MARI enables you to work on multiple maps at once because of UDIM space. So why not make full use of it! Pick a naming convention for your shaders in whatever program you use to correspond with the UDIM space they occupy. For example, use 'uv1001_subdrone_vRay' as the name of the shader for a group of parts living in UV space 0-1 using a V-Ray shader. This will enable you to look at your shader and know what you're up to if you're not working on it straightaway, for example if it's a week down the road. It'll make life easier especially when you start spraying parts. Think of it as working from big to small with your initial shaders taking on the biggest, known amount of planned parts. You'll probably add pieces to your model later down the road, and you can plop those new parts in a new UDIM with a corresponding shader name. That shader might have a name that describes what that part is as it's an addendum.



> Maya's UV tools in the 2015 version are pretty great. You can enter a live UV scenario in which you can pick edges, separate and see what you get in the UV editor, then change your cuts to better serve your purpose in paint. This is a painless alternative



> Use MARI's channels and layers to build up all kinds of different aspects of your paint job. For the sub drone, we have used a base colour layer, a camouflage colour layer, a mechanical parts layer, a dirt layer, a decal layer and a scuff layer

12 Paint it Once everything that you want paint on has UVs, save an OBJ and send it to KeyShot. You can certainly stay in Maya and play with mental ray – we prefer KeyShot as our first try, since it's so fast and we're only dealing with a still for the project. Remember, the sooner you can get feedback from your final renderer, the sooner you're troubleshooting and directing your paint and maps. Get in there! Now you have a working model that lives in Maya, KeyShot and MARI. You can test as you paint. Use MARI's channels and layers to build up all kinds of different aspects of your paint job. For the sub drone, we have used a base colour layer, a camouflage colour layer, a mechanical parts layer, a dirt layer, a decal layer and a scuff layer. With the controls in MARI, which are not dissimilar to Photoshop, you can achieve a look that you're confident in during paint application. Once you're done getting a fresh pass of paint on your model in MARI, save out your baked maps that correspond to your similarly named shaders in KeyShot and Maya. For instance, your output from MARI for a texture might be 'uv1001_DIFF_01.png'. This is for your parts living in UV space 1001, it's a diffuse colour map and it's the first version should you decide to change it. It's clear and short. No need to muck around with where the part lives on your model, just think about where it lives on your shader.

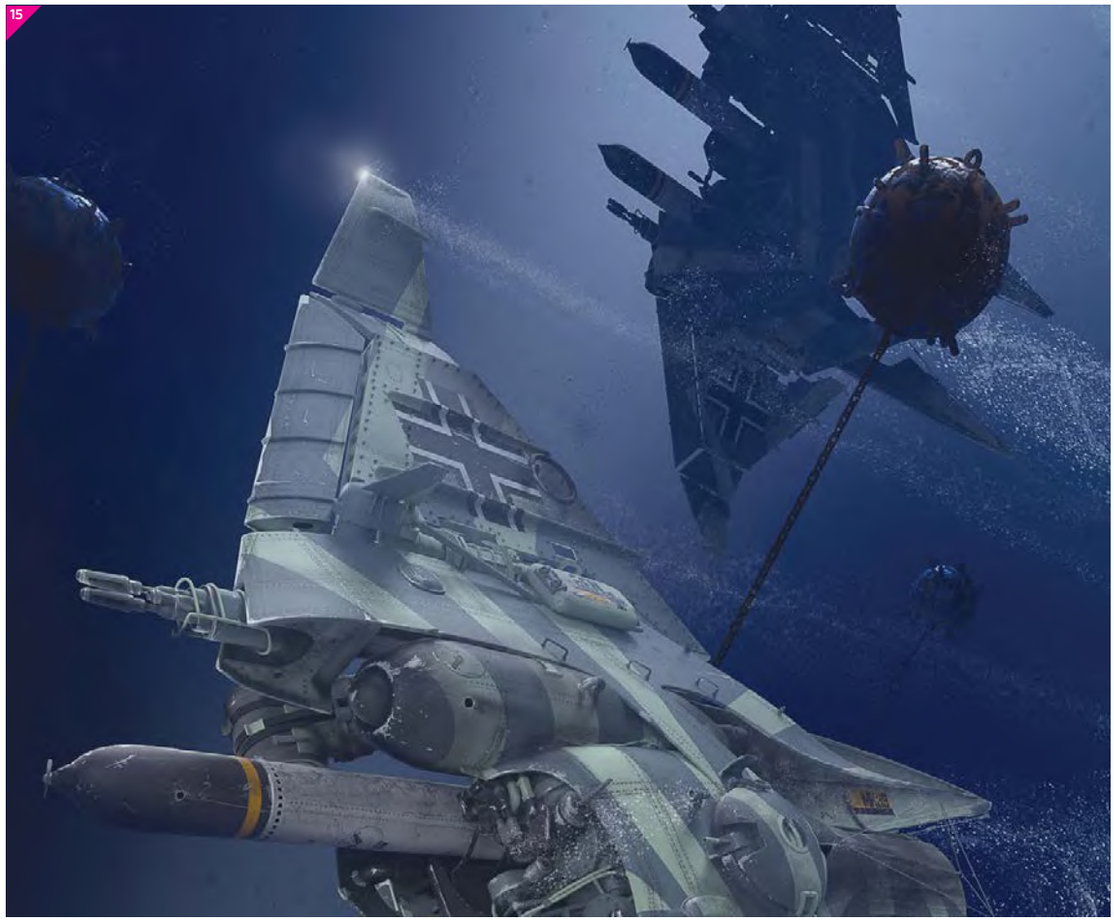
13 MARI paint templates Get out in the world and sniff out what you're painting. Google is great for getting you in the ballpark, but once you get a feel for what you are after, get a camera and snap away. If you have a DSLR, shoot textures with a long lens in flat light and harsh shadows. Remember that Dropbox folder you set up? Use it. Get these maps in there. For a vacation, we went to Pima, Arizona and shot a bunch of airplanes from a number of eras in time, then went to a submarine in the San Francisco Bay and shot a bunch of nautical parts, including the torpedo. Doing things like this gets you outside and exposes you to other relevant parts of the types of things that you clearly already have an interest in. Make a directory in your local drive and keep your favourites handy, then drag them into the Image Manager in MARI to use as paint templates. You will begin to have a very intimate relationship between the cloud and your local workflow.

Lookdev swatch

I was in an automotive finishing shop recently and was very interested in what looked like a wall of shoes in an athletic store, only the shoes were duplicate shapes of concave and convex surfaces painted in a variety of different colours and coatings. They were essentially 3D paint swatches right in front of me! 'Brilliant!' I thought. Each shape was a collection of common forms and their transitions that can be found on a car. I'm sure there's a name for this thing, but I wanted to make one for my own testing of materials on the computer. So I came up with a simple shape, made some UV maps and set up an environment scenario for it to live in. I tilted the shape so I could see it from a number of different angles in one turntable. Voila! My little lookdev swatch project was finally born! It's like the teapot of old, only mine has lots of hooks and whistles that have been set up in order for my shader work to behave predictably. I don't have to think, I just have to paint, render, adjust some settings and send a turntable overnight for motion tests. I used this method when it came to working on the torpedo!

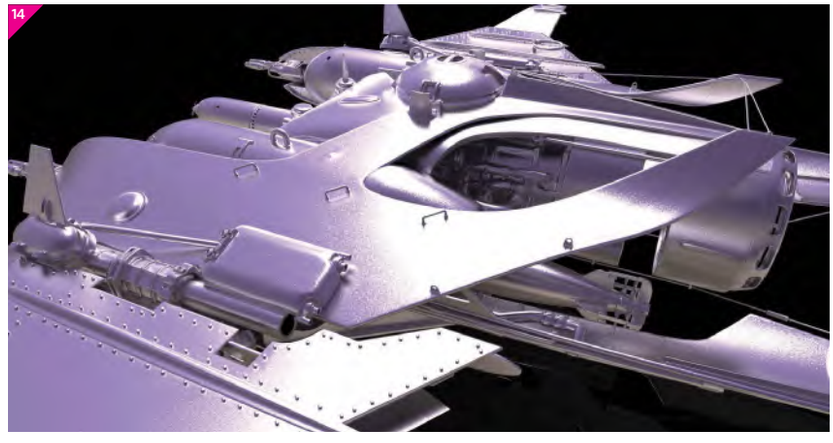
14 Render it We chose KeyShot for this render. There are some controls in more sophisticated render packages like V-Ray (which has reflection colour and shader layering, for instance), but for a still, KeyShot is plenty good, with some compositing of different renders done in Photoshop. The image is composed in an aspect ratio that will fit into the page of this magazine – when rendered at 4,000 pixels high and at 350dpi, this 4K resolution is perfect. Lock your camera before you render and save. You'll be able to return to the camera and render out different passes with different maps in the future. For this tutorial, we rendered a diffuse colour pass, a metallic pass, a black material pass with some broad shading, and that was it. Render out some PNGs with a transparent background for all of your compositing purposes.

15



15 Comp it For your final image, try to put your model in a setting that helps convey what it does. Sure, a blank background is sexy, but when you do this you're suggesting that the viewer only considers the object. They may ask themselves, 'Am I to decide if this is a good collection of shapes or a well-built model?' This is fine, but you have the option to give them just a bit more and say to them, via a background, 'this is its story'. We referenced offshore speedboats as seen from a helicopter for the final image, showing the sub drone in its cruise mode prior to splashing down for the hunt. The document is the size of the render and all the renders have been brought in, setting each with a layer mask. We can now paint in the detail we need from each layer over the diffuse colour pass. The water is a blurred photo, adjusted to match the sub drone's lighting. Once the comp is done at a reasonable level, we merged the visible, desaturated layer. Then we used the Overlay Transfer mode to marry the background and sub drone. A vignette further marries the two.

14



14

14

World creation

Your design or model will have some reason for existing. Because it exists in a particular time and place, you can springboard off of existing things of that era, and invent new ones that serve to support your new entrant in that place. For my sub drone, I sketched some elite divers and modelled custom rolling racks for loading and unloading both armaments and the drones onto catapults on ships. Because the navy didn't have aircraft carriers, they'd retrofit cruisers and battleships with the steel catapults. I also researched mines and designed some minefield layouts. You could go on and on with more parts.

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

BECOME A PROFESSIONAL DEVELOPER *in* 12 WEEKS

makersacademy.com

MORE

Achieve more with our MSc in Creative Technologies and Enterprise

Not all postgraduate degrees are created equal. Study for yours at Bath Spa University and give yourself a head start in the creative industries.

Our course will help you hone your creative skills, making sure you're prepared for the rapidly-changing global digital economy.

Get more from your future, visit bathspa.ac.uk/cte

BATH SPA UNIVERSITY

DIFFERENT THINKING

TOR FRICK
Rocket combat mech, 2015

Software
MODO, Photoshop, Marvelous Designer

Learn how to
- Create a kitbash set
- Kitbash
- Hide repeating elements
- Place efficient decals
- Distribute details

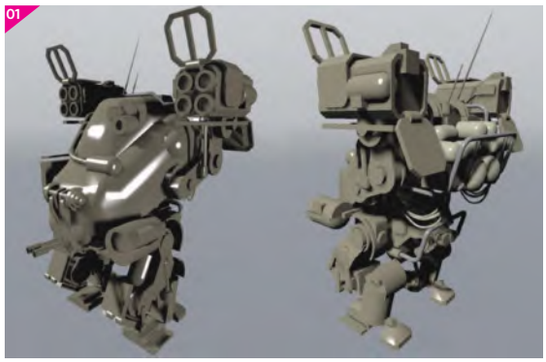
Concept
I wanted to make a mech heavily influenced by maschinen krieger, with a heavy feel and layers of details and plates that are gritty and worn from use.

YOUR FREE DOWNLOADS from **filesilo.co.uk/3dartist**
- Tutorial screenshots

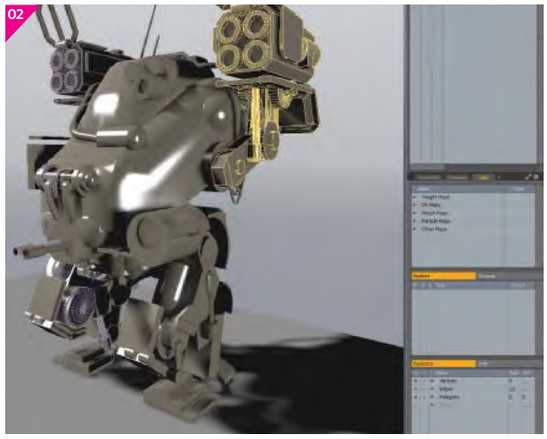
Model and kitbash a mech

Build a semirealistic render, showing off the design of the mech

In these steps we will give an overview of some of the main steps taken when building complex mechanical models from the idea to the finished product. We will explain the thoughts behind the choice of workflows and why we do things in our chosen order. The focus is on kitbashing and quick detailing, and how to avoid the pitfalls that normally come with these workflows. For example we will teach you to use kitbashing extensively while avoiding a repetitive look. We will also show you a process for quickly adding decals and custom text to our meshes. We mainly used MODO 901 and Photoshop for this model, but most of our steps are not program-specific and are adaptable to almost any workflow.



01 Create the blockout This might sound like a no-brainer, but it's worth mentioning. The foundation to a good workflow starts with a good blockout. It's good to identify kitbashing methods and pieces as early as possible. By finding reoccurring shapes in the blockout, we can plan our kitbashing elements ahead. For example in this model we have relied on cylindrical elements, hinges and different kinds of rails in the detailing and construction of the mechanisms.

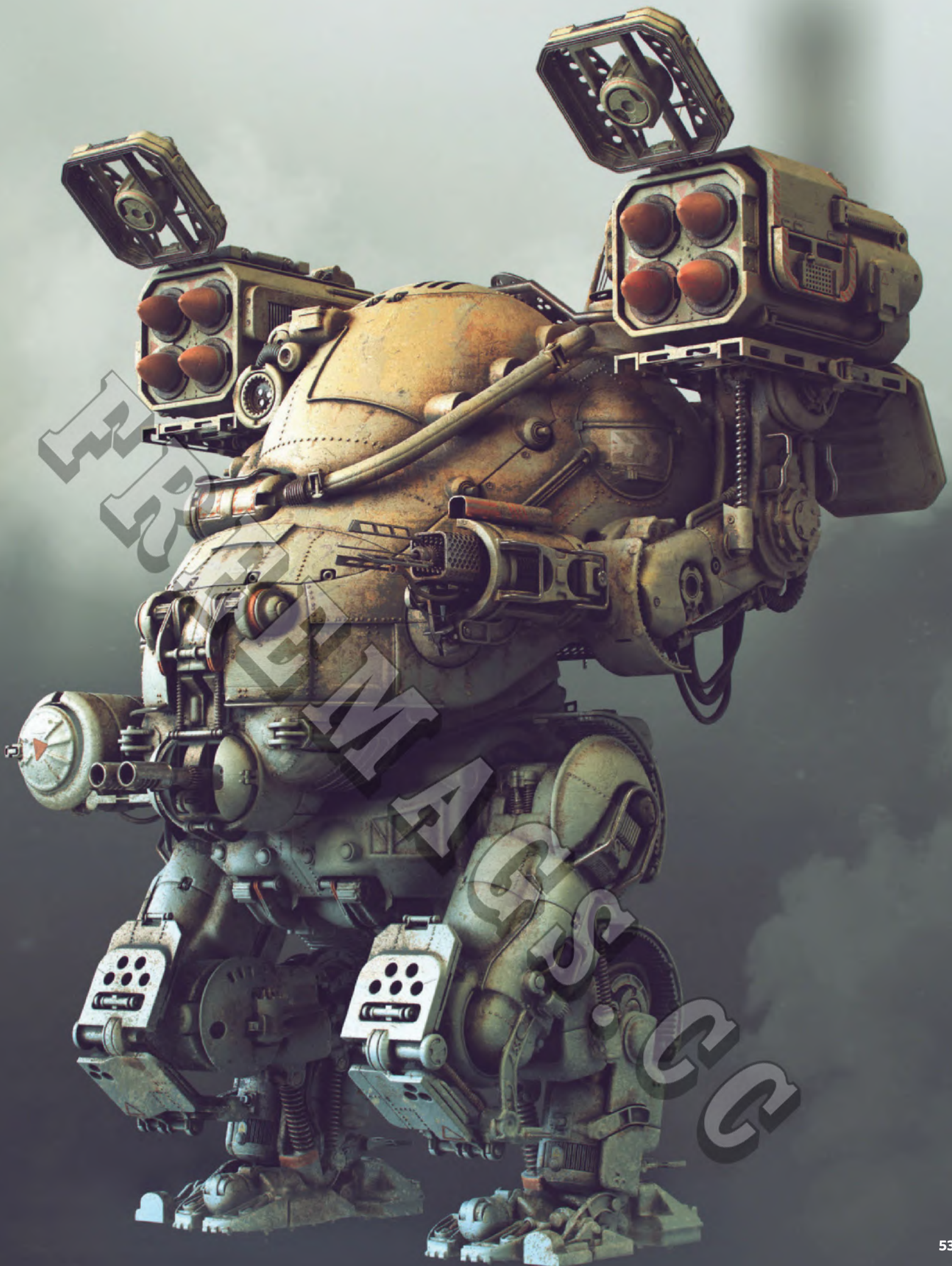


02 Set up the scene When working with any kind of complex model, it's good to take the time to set up a solid scene structure, as well as things like mirrored instances. A good method is to have the instances and mirroring set up correctly from the start, so that we can see the end result of the model at all times. It's also good to set up animated parts with test animations, so that we can make sure that things work the way we want them to without accidentally ruining mobility or functionality.

> "By finding reoccurring shapes in the blockout, we can plan our kitbashing elements ahead"

03 Assemble kitbash pieces and details Using the blockout as a base, we can identify possible kitbash pieces as well as find the style for the detailing. Create a decent number of kitbash pieces that you think will be enough to cover most situations on this model. Throughout the modelling phase keep adding to the kitbash library as you will find reuseable elements while building. Try not to create details that are too specific with the pieces so that you can reuse them easier.

Reusing elements
If you are working on a series of models that are sharing the same underlying design principles or style, kitbashing is even more efficient. Reusing elements between models and constantly growing your library both helps maintain a visual style as well as speed up the detailing process. A good habit is to dissect your model after completion in search of good kitbash elements. It's easy to forget once you are done with something as you just want to finish working on it, but it's well worth the time.

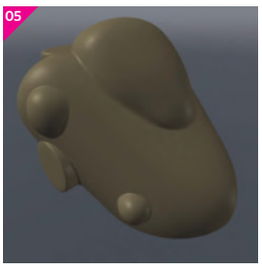


FREEMAGIC.CC

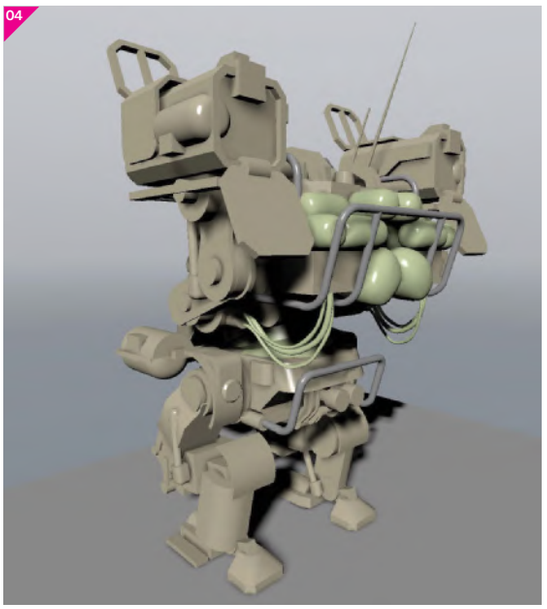
04 Set up core materials and colours Set up the core materials early on – this enables us to keep track of how noisy the final model will be visually. This allows for easier focus on the modelling and a better distribution of the elements because we will be able to catch cluttered or drab areas earlier. It also speeds up the texturing and shading process, since the majority of the materials will already be in place. It also saves time since we will be copying and pasting a lot of elements around.

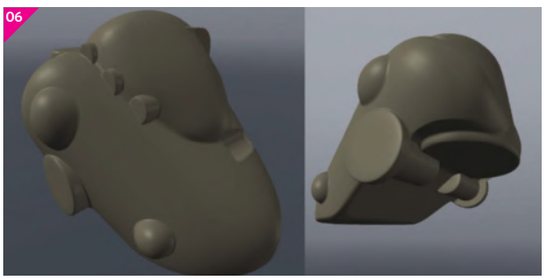
05 MeshFusion base elements For some of the main elements of the model like the cockpit, use MeshFusion to iterate quickly on the large shapes instead of on a traditional mesh. MeshFusion works best when you have large complex shapes and forms that do not need to match an existing design, that's when it really shines. It allows for very quick experiments with shapes such as this. Spend some time experimenting in this stage, deviating from the original idea a bit to see if we find something new since the iteration speed is so fast. The rest of the model is hidden for clarity.

06 MeshFusion polish After getting the base shapes right, convert the MeshFusion to a schematic fusion, which enables us to do a few more complex things like layering the fusions on each other. Spend some time adding additional detail to the MeshFusion as well as cleaning up the angles and setting up the correct hardness of the intersections. Add all the large and medium-sized shapes needed for this part of the model – basically, add everything that needs large, soft transitions. Leave finer details out of MeshFusion entirely.

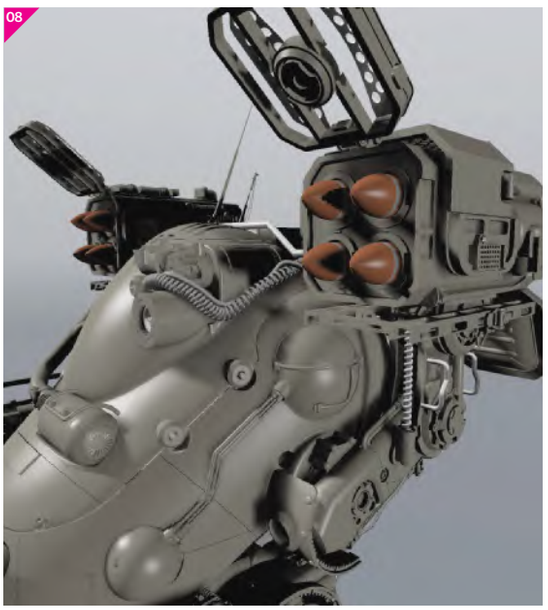


07 Freeze the fusion After we are done with the MeshFusion modelling, freeze a copy of the fusion mesh and start to model with that as a base. We do this because MeshFusion can get quite sluggish when you abuse it too much with many separate pieces. Separate the mesh into pieces, like the cockpit lid and the base, and start to do more detailed modelling and panelling on it. Use MODO 901's new cutting and capping tool to create quick panels and seams in the mesh.





08 Main modelling stage This is the biggest chunk of work for the model. Go through the entire model and model out all the main elements, or replace blockout parts with kitbash pieces, then do a detail pass using the kitbash pieces and flesh everything out to a near-final state. After this step, the majority of the mech has been modelled. During this stage we used a lot of Booleans in the modelling, combined with reused parts to speed up the process. It is during this stage that it's easiest to find new material for the kitbash set.



09 Kitbash filler For areas that are hard to see, or out of focus, kitbashing can be a great time saver. Sometimes you need to fill large holes or areas with details, but doing them all by hand can be time consuming. A few areas of the mech could do with some more filling out, so just reuse existing parts (since this is not an area you will see all that well) – making it fit together is not so important.

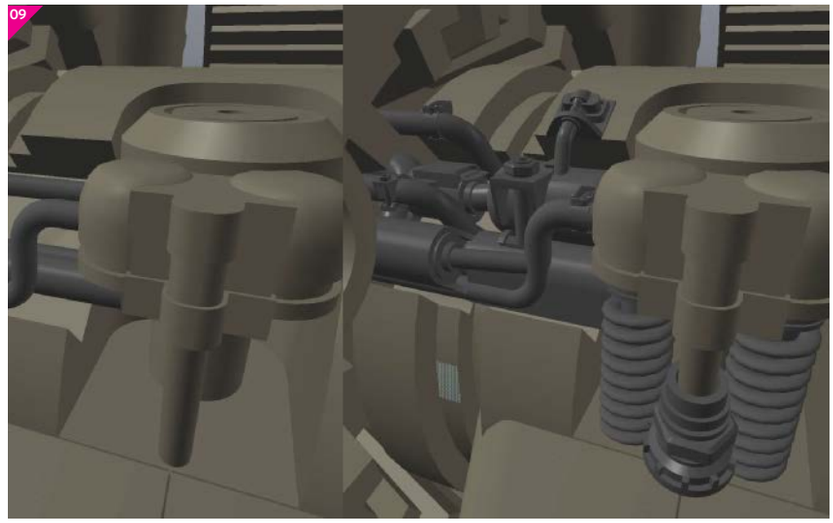
10 Cover up the kitbashing Once we have used the kitbash pieces everywhere, it starts to look overused and you can spot the repetition if it's not hidden well enough. Always take a quick pass to change some of the more obvious reused ones by adding or subtracting elements from them. The majority of the touchups we do includes rescaling parts of a kitbash element or just deleting parts of it, or covering/adding to it with some additional simple shapes. Most of the time, simple changes are enough to get away from repetition.

11 Sculpting and cloth To break up the monotony of the metal surfaces, it's a good idea to introduce some cloth and additional equipment (like bags for example). Parts of the cloth is sculpted in MODO by using the sculpting tools, which are great for quick, basic sculpting. For the more complex parts like the bags, we used Marvelous Designer combined with some quick shapes to simulate bags with packing in them. They are then instanced out in MODO so that the file does not explode in size.

12 Set up the floaters Before we do the very last detailing step with floating details, we need to create a small selection of details that we can clone out over the model. A selection of rivets and different small insets is more than enough for this model. A good trick is to give them their own material, so that you can easily mask them out if needed.

> "Before we do the very last detailing step with floating details, we need to create a small selection of details that we can clone out over the model. A selection of rivets and different small insets is more than enough"

09



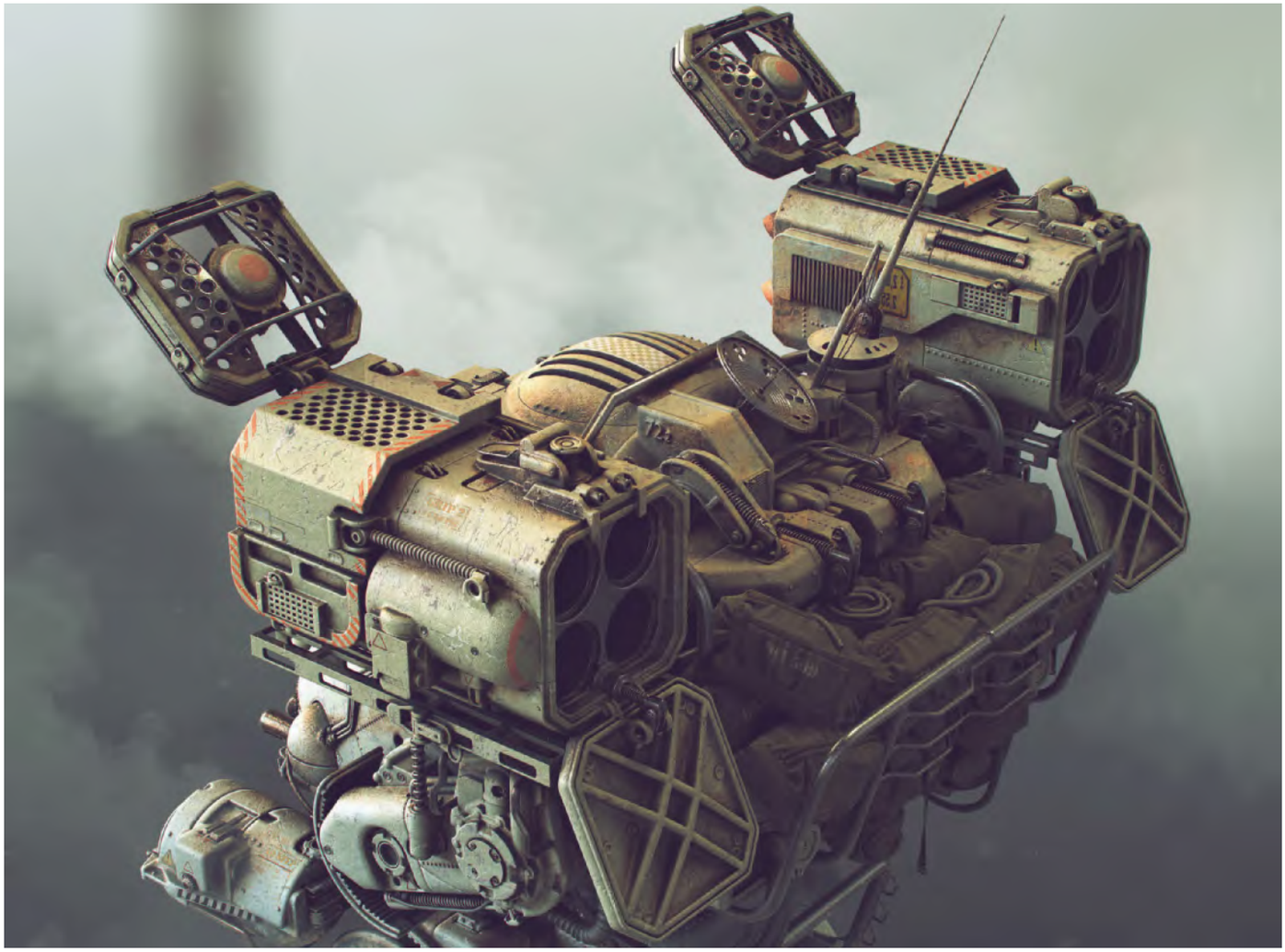
10

12

Do your UV maps earlier!

If you are aiming to texture and render the high-poly model properly, make sure to UV your kitbashing pieces before you start redistributing them in your model. That way you have already done UVs for a large part of your model from the get-go. Even if you alter a lot of the geometry later, the base unwrap still carries over.

11

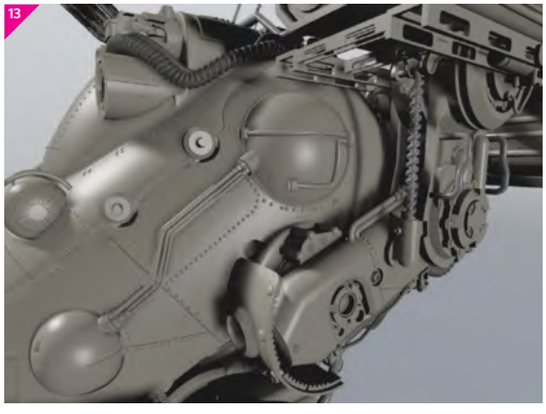


13 Fine detailing This is the final detail pass where we add the rivets, small details and so on. The reason why we do this so late is because it can make or break a model. Sometimes it's hard to know what you have until this the model is almost complete. We do not want to create overdetailed areas, or cover areas of rest with small detail. The Tack tool and Clone tool are your best friends when it comes to placing detail meshes in MODO.

14 Set up the decals The same way that we set up kitbashing elements earlier, set up a number of decals that we can combine: a few generic warning signs, some numbers, as well as some custom decals. Create these as separate mesh planes with a texture so that you can place them more easily using the same tools, the same as when placing the mesh details.

14

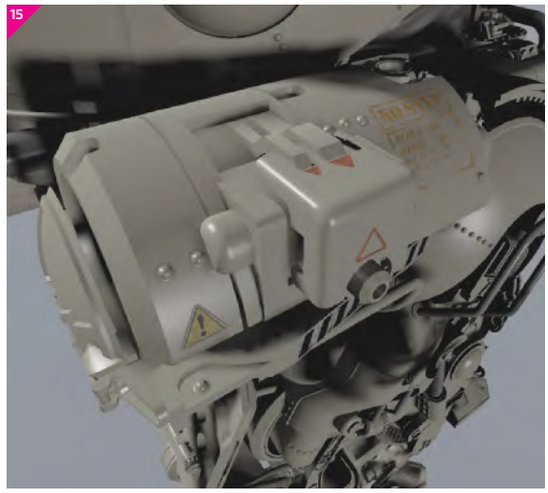
13



Rendering floaters

One problem with using floaters in renders is that if used incorrectly, or too aggressively, they can become quite obvious. There are a few ways to minimise their impact in the render. One is to separate them to their own layer and turn off shadow casting. If you render an AO layer in MODO, do it using an occlusion node instead of the AO render output – this method creates a fake and faster AO that doesn't highlight the floating details.

15 Place the decals and text The same way that we were holding off on adding the small detailing like rivets and so on, we hold off on adding decals until the end. We don't want to end up with a cluttered model with too many decals in obvious copied-and-pasted locations.



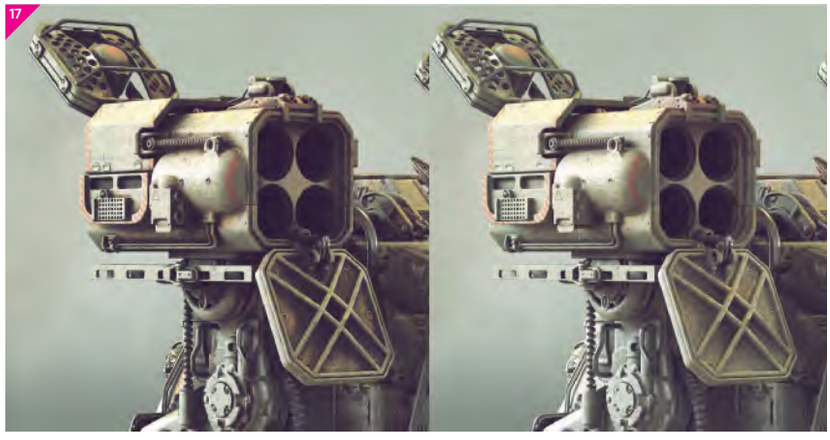
16 Set up materials Set up some instances of the materials so that you can easily create more colour variations without having to create new base materials from scratch. We do a lot of the colouring by just tagging materials instead of adding textures to the model, saving us a lot of time when doing quick designs. Do not be afraid to create extra cuts and lines in your model only for the purpose of assigning colours. The main colour variation in the mech comes from material instances only. A simple tiling Bump map and diffuse texture are all that drives the main material.

> "We do a lot of the colouring by just tagging materials instead of adding textures to the model, saving us a lot of time"

17 Postrender tweaks After rendering out the model, we take it into Photoshop for some quick touchups to get our final image. A quick trick is to render out an ambient occlusion layer and multiply that, combined with a colour to get a very basic dirt pass for the render. To get away from that artificial look, play with the layer blending and manually mask away parts where the AO is too strong. A few quick material overlays can get you a long way.

Decals

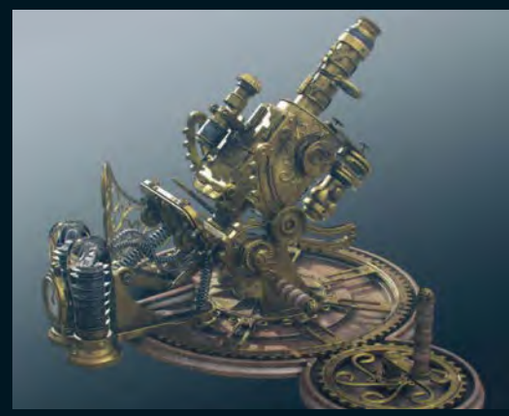
An alternative way to create the decals is to have a decal sheet as an image only, and then camera project UVs from the viewport onto the decal sheet. That way you do not have to bother with planes for the decals, and it can make things easier.



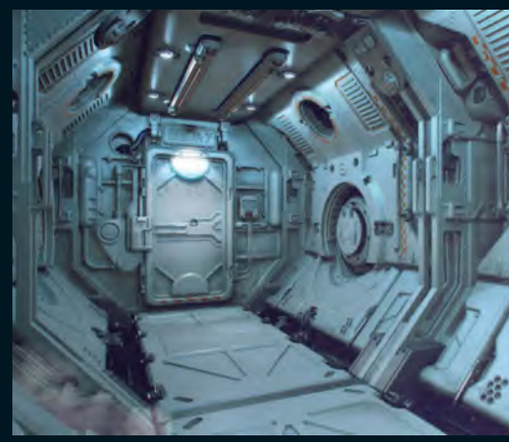
Showcase

Tor Frick

I am 3D generalist working in the videogames industry as an art director. I spend most of my time talking, studying or making 3D in different ways, preferably involving sci-fi and machines.



***Steampunk microscope*, MODO, Photoshop (2015)**
A study in modelling and shading, breaking away from sci-fi for a bit.



***Scifi corridor*, MODO, Photoshop (2015)**
A sci-fi corridor speed-modelling session for exploring new features in MODO.

***Scifi speeder*, MODO (2015)**
A sci-fi vehicle I made as part of a larger scene to test out new techniques. Textured using procedural shaders only.

CALEB NEFZEN (DAVID MOLINA)
WarChief, 2015

Software
Marvelous Designer, ZBrush, KeyShot and Photoshop

Learn how to
- Use basic features of clothing
- Stitch pieces
- Create basic shapes in Marvelous Designer
- Test the Morph Target
- Texture
- Pose the character
- Sculpt the head
- Use references

Concept
The concept was made after I did some advances on the sculpt and pose; this process helps greatly when you have a clear idea of what you are after. So I sculpted a basic head and body, made the pose, and over it I did some doodles of what I had in my mind regarding his outfit.

YOUR FREE DOWNLOADS
from **filesilo.co.uk/3dartist**
- Clay models
- Tutorial screenshots

Master realistic clothing

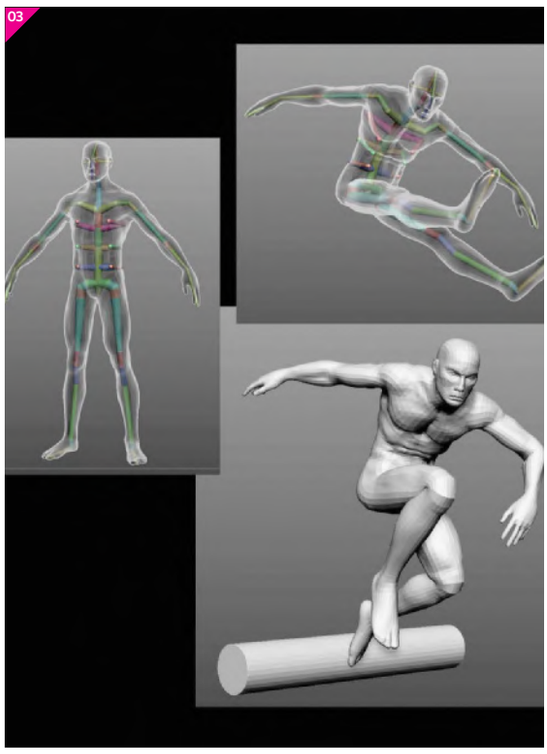
Render a realistic 3D still of a Native American, using Marvelous Designer, ZBrush, KeyShot and Photoshop

Over the next few pages we will cover all of the essential techniques in creating a Native American character from scratch, including: sculpting, clothing, texturing and rendering. With the use of Marvelous Designer, we will show you how to create realistic clothing, enhance the sculpt and make your render look more believable.

From stitching and playing with the different features of the cloth we will achieve some great results with almost no effort thanks to this amazing piece of software. We will then go into ZBrush for some tweaks, fixes and for some Polypaint. Finally, we will jump into KeyShot to work on the final render of the scene.

01 Use references First, you need to get deep into the character you are making. In this case, since it's a historical character, you must look out for accurate references. Get as many as you can – you will never get enough. Getting references will help you in the creativity process without going too far, so you can keep everything grounded. You should always leave some space for adding your own mark.

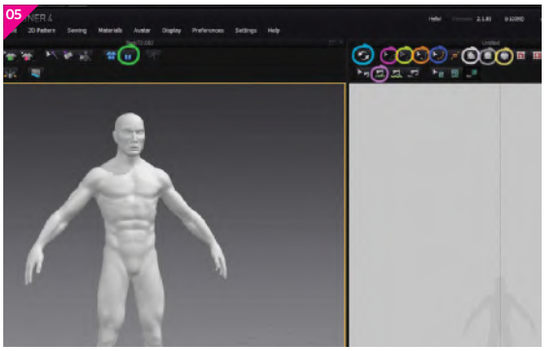
02 Basic shapes Based on the different references, we start sculpting his head and always keep in mind his special face features. The same goes for his body. Try to not spend too much time sculpting details, as we will do that later. At this stage we're only aiming to have the basic shapes of his head and body, with a nice topology, so we can pose him quickly. The purpose is to have him in a T-pose and a Dynamic pose. We will explain why this is in the next step.

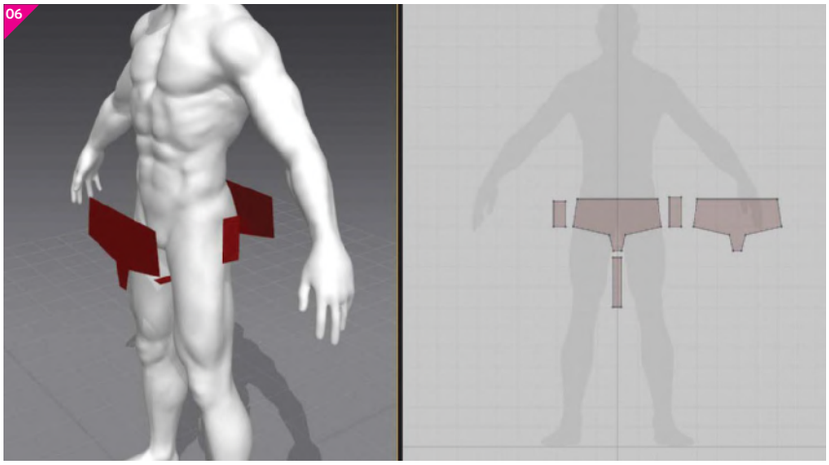


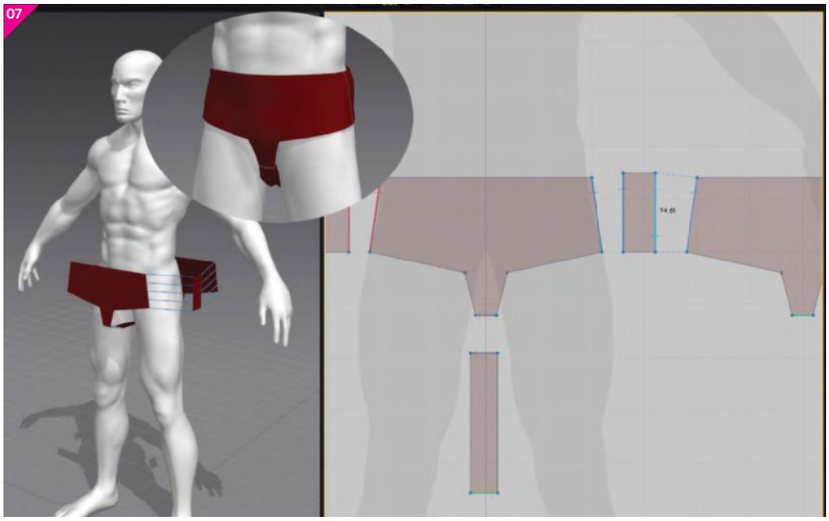
03 Dynamic pose Using the ZSpheres rig in ZBrush, start creating his skeleton. You don't need to do anything fancy here, just place his bones. The more accurate this is, the easier it is to pose him with this kind of rig. It's better to focus on each part one at a time so that if you find something wrong, you can fix it easily using the timeline. Otherwise you will lose the work that you've done on other parts after moving.

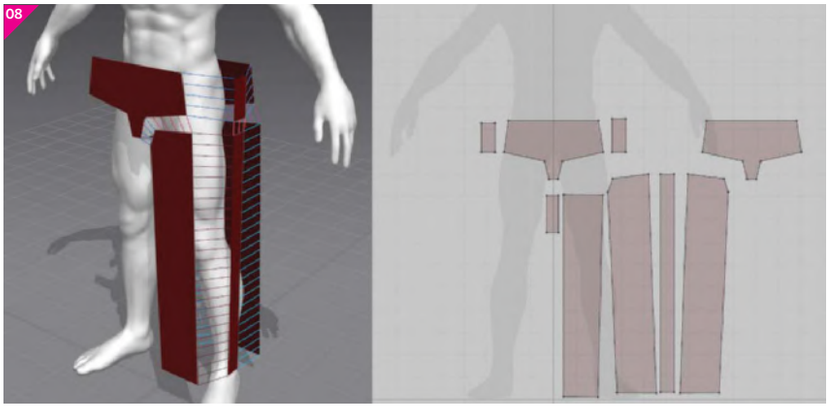
ZSpheres rigs don't always work
Sometimes, you may find that it's better to mix both styles of moving your character. I tend to use the ZSpheres rigs first, then use the normal Transpose Master to end the posing of my character. This is very useful when the character has a very demanding pose, with very complex pieces.

“Using the ZSpheres rig in ZBrush, start creating his skeleton. You don’t need to do anything fancy here, just place his bones”









04 Import your model Go to Marvelous Designer and create the clothing using the T-pose model. Once the clothes are done, import the model so that the cloth will make the transition to the posed one. Testing is simple: create a new scene and import your model. Once it's in the scene import the posed model. Instead of choosing 'Load as Avatar', pick 'Load as Morph Target', this makes an animated transition from the T-pose to the posed model. If this didn't happen, you may have some problems or differences between the two models.

05 Create the first shape In the 2D window, use the tool that we have highlighted as white to start creating the basic shape for the pants point by point. It doesn't need to be very complex, it's just like working with pieces of paper. Start with a few points – at this stage it's better to be clean and simple. We recommend that in the Preferences palette, you select 'Snap to Grid', as this will make it easier for you to create accurate shapes. Once the first shape is created, press the Sync icon so that it gets transferred to the 3D window space.

06 Complete the pants shape Start moving the different pieces created in the 2D window to the 3D space. Bear in mind that even if you are working in a 2D space, you must visualise it like a box – in other words look at where the pants go around the waist. The pieces for his pants' waist consist of the front, a side, back, another side, the piece that goes between and below his legs. Always keep it clean and simple, as that's how you must work in Marvelous Designer.

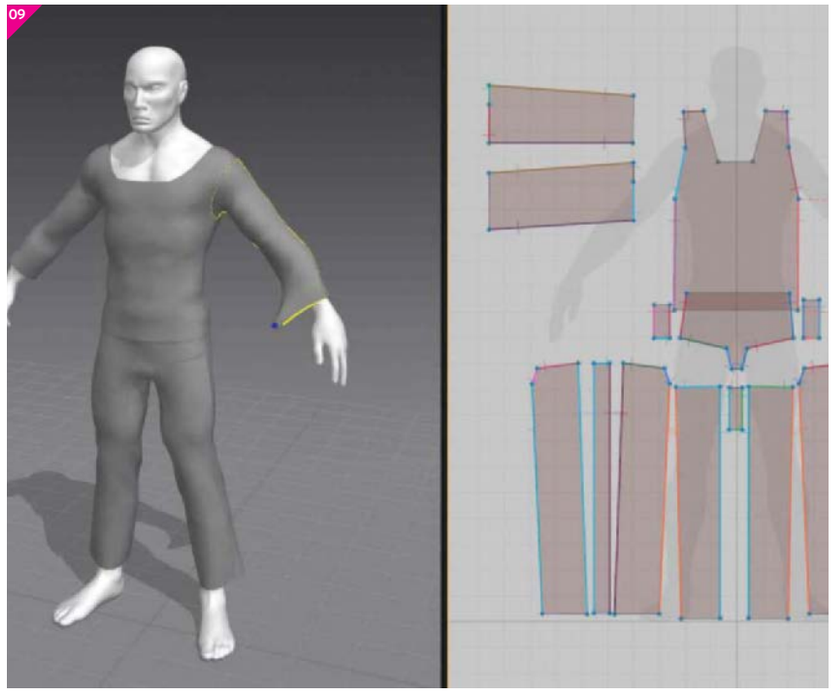
07 Sew the shapes Once you're done with the basic waist shape, start stitching each side to the next. This is tricky and it's hard to explain with words, but with the sewing tool you can get a bit of help thanks to the lines being different colours to indicate the direction your sewing is going in. Also keep your eyes on the 3D window, where you will see how the sewing is turning out. To test it, press the simulation icon in the 3D view and you will see how the gravity affects the clothing you just created. If the sewing has any issues, the simulation will always show you errors.

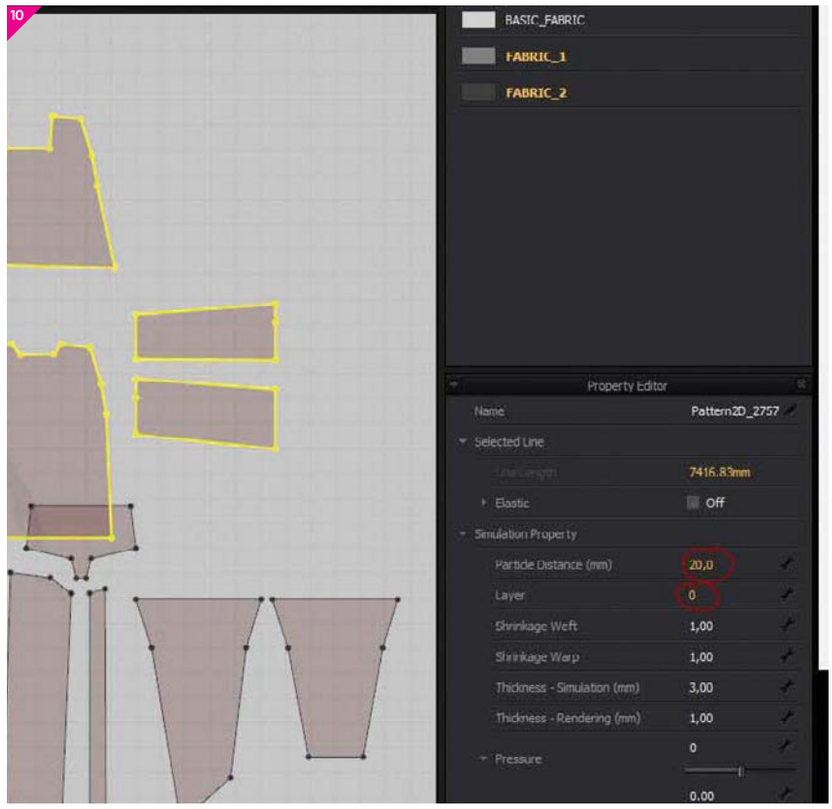
08 Continue with the pants Once the test on the first piece shows that you are on the right track, proceed with the other parts. Always keep everything clean and clear because with more pieces coming, the sewing will start to become confusing in some areas. As you can see there is no symmetry here, so the left leg that has just been finished should now be cloned. To do this, just select the shapes, press Cmd/Ctrl+C and Cmd/Ctrl+R so that it gets cloned and reversed. Sync and then sync the respective sewing of the pieces. Don't forget to test it again and again.

09 Make the shirt The shirt is made following the same steps as before by creating simple shapes. Be mindful, though, when sewing the piece and testing in the 3D scene. We're creating a simple design, but you can go crazy. If you wanted a looser shirt, just make the edges wider and more spread out. The great thing about Marvelous Designer is that you can test every step you make in real-time. You can even pull the clothing when the simulation is on.

10 High density for greater detail In the Property Editor, there is an option called Particle Distance – this option is like the resolution that the cloth has. The smaller the value, the smaller the distance between particles and this makes for denser and more precise cloth simulations. Usually this is always on a value of 20, but once everything is done, it's a must to pass the different pieces to a value of ten or eight. Also it depends on how you want the cloth to behave. This value must be added before making the transition to the posed model so that the clothes can behave accurately.

11 Make the morph It's now time to import the posed model, but as a Morph Target. Once this is done, the model will do the proper animation, morphing into the posed model. With the simulation running, we can modify certain things in real-time, making more wrinkles or moving one of his sleeves down or up. Just test to see what is best.





Keep playing with the shapes

Don't forget to play, even if you are following a specific design. Since there are several parts that interact with each other, it's better to assign each part an order layer – the pants will be the first layer and the top vest will be layer four. This will help to run the simulation without any issues. If you get lost when sewing, just follow the coloured lines as they are always in a straight position. If they're not and they're crossing, then something is wrong – usually this means that the piece is not flipped out or the connection is wrong.

12 Back to ZBrush Once you're done in Marvelous Designer, export and import the OBJ into ZBrush. Once there, split the pieces into different polygroups and create a better geo. Using ZRemesher with the same amount of polys, you will get a better result and a better mesh to work with. Be clean, split by polygroups and name every single tool with a clear name.

13 Use of polyloops You must start adding thickness to the different cloth pieces now. Using polyloops, you can add the necessary thickness to the tools, but not before you make a new topology. Now we will clone the tool, apply the ZRemesher with a decent amount of polys, add subdivsion levels, project the details, freeze it and add thickness.

Getting a graceful silhouette

Learn to observe everyday life and how the human body acts, balances itself and moves so you can start to create natural and balanced poses that push limits in a believable way. Here, the shoulders tilt in the opposite direction to the hips to compensate the weight. The pose is almost an S shape, something playful and flirty, yet balanced. Along with the flow of the shapes of the dress, it can help you to get a solid composition and guide the viewer from the face, down to the fabric on the ground.

14 Feathers To make the feathers using FiberMesh, we create a simple stick. First make a mask in the middle, then invert the mask so that the stick is on its sides now. Then using different values in the FiberMesh options, work with the shapes, length and gravity. We played around with these options several times to achieve different kind of feathers. Playing with the values and using references is the way to do it.

> Using polyloops, you can add the necessary thickness to the tools, but not before you make a new topology

15 Add details We made the crown by just duplicating the feathers and positioning them in the right order. It's a good idea to keep each feather as a polygroup, in case we want to move them afterwards. Creating this kind of detail in the beginning led us to put the same amount of feathers on the rest of the sculpt. This is a step where patience is a must, if you rush things, then it will be shown in the sculpt. It will make it look unpolished and wrong, so take your time to do it.

16 Final compositing With the help of some render passes, you can work on the final 3D still in Photoshop. We tend to try to make the render almost close to the final result without the needs of these passes. This is even more true if you are working with software like KeyShot. The clone and depth passes are the most used for us in this case. Work on the levels, brightness and contrast in the different elements. Be free with yourself, there are no rules in this world, and where rules may exist they are meant to be broken.

Showcase

Caleb Nefzen (David Molina)

I've been fascinated by sculptures since I was a kid. One day I discovered the path of 3D, and I have never looked back. I must admit it was not easy. I had to start a new life all over again and learn everything by myself. I worked hard and practised all night, covering areas like conception, sculpting, texturing and rendering. And well, there's still more to learn and more to do. As a friend of mine said, "we are students for life".

Frazetta Chess Set **ZBrush, Maya, KeyShot (2015)**
This project was very hard, demanding and stressful. I had to translate the most iconic Frazetta paintings into chess pieces. My only goal was to do justice to the paintings.

Mictlantechtli **ZBrush, Maya, Keyshot (2014)**
I worked on this character for a webinar, which was aimed at people just starting out on ZBrush. I chose this Aztec lord for the dark appeal he has. In folklore he is accompanied by an owl, a bat and a spider.

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

WS-X ENHANCED WORKSTATION

BUILT FROM THE GROUND UP FOR OPTIMISED PERFORMANCE AND ROCK SOLID RELIABILITY

INTEL INSIDE ® EXTRAORDINARY PERFORMANCE OUTSIDE.

CONTACT A REPRESENTATIVE

WWW.WORKSTATIONSPECIALISTS.COM

+44 (0) 800 180 4801

SALES@WKSMAIL.COM

Workstation Specialists

© 2015 Workstation Specialists – Acecad Software Ltd. E & OE. © 2015 Intel Corporation. Intel and Intel Core are trademarks of the Intel Corporation in the U.S. and/or other countries. Logo & company/ product names are trademarks of their respective owners

Our experts

The best artists from around the world reveal specific CG techniques

3ds Max

Vikrant Dalal
project01studio.blogspot.in

Vikrant has several years of experience in VFX. His company, Project01 Design Studio, produces 3D tutorials

Houdini

Rainer Duda
rainer-d.de

Rainer Duda is a Houdini TD who specialises in advanced environment creation techniques and enjoys life to the full

3DS MAX

Build a tree using a Particle Flow system

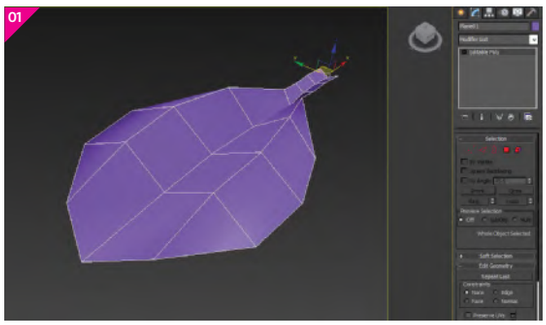
In this tutorial we are going to take a look at how you could form a tree like those seen in fantasy films such as *Jack The Giant Slayer, Noah* and many others.

There are number of software packages available in the industry that can create this kind of effect, like Houdini and Softimage. If we go into 3ds Max itself, there is a plugin called Ivy Generator, which can make plants or ivy – we are not going to use a plugin, however.

To create this effect, we are going to use 3ds Max and its Particle Flow system feature. For this tutorial, you will need a basic knowledge of Particle Flow so that you can understand the event development. We can't teach you each and every parameter of this Particle Flow system, as there are too many actions and operators. The system is also vast and will need a lot of time to go through, so as far as the tree formation is concerned we will learn as much as is required for this particular tutorial only.

Before you start working on this kind of effect, you should have a good knowledge of real trees and also what kind of species of tree you want to create. For example, this can be a small tree, huge tree, tall tree, short tree, or even bushes and ivy. You must know the height and diameter of the tree you want to make, how many big branches it has, how many small branches it has, any leaves or fruits on the branches and so on. So you should find some kind of real-life reference first and then start working on the actual shot in CG. Also you should have good knowledge of Space Warps (Forces) in 3ds Max, because we have to know which Space Warp will be the most useful for us.

This is a very interesting subject, because you can't define just one single process to create this effect. It very much depends on your own understanding of the tools and how you use them as well as techniques. No matter how much you use your own creativity and tools, you will still be able to create different types of effects every time. So get ready for this exciting tutorial!



YOUR FREE DOWNLOADS
from **filesilo.co.uk/3dartist**
- Tutorial images

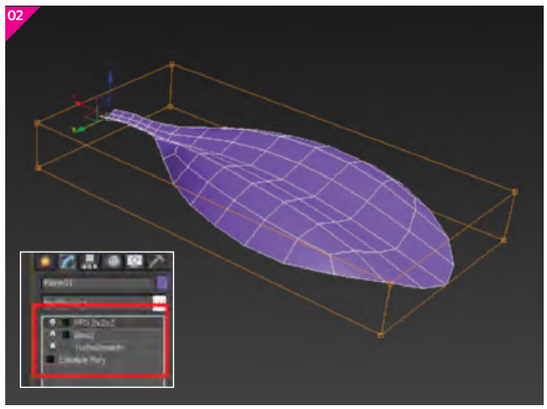
01 Create the leaf Use a simple plane to model the leaf – the most important thing here is to create this leaf with as few polygons as possible. This is because we are going to use many particles, so you may face some system limitation problems. Try to build this leaf model in 15 to 20 polygons. You can use a simple plane with a real leaf texture on top of that, and this will definitely reduce the memory usage to make it all work smoothly.

02 Animate the leaf After finishing the modelling of the leaf, we have to animate this leaf and for that we are going to use Modifiers. First, we will use the Bend modifier and then use the FFD modifier. We will use the Bend modifier for secondary animation and that's because leaves shouldn't be stiff. Then we will use the FFD modifier to animate the scale of leaf. We want the leaf to be delicately attached to the branch, so we will animate it from a very small scale to its original scale. Because of these two modifiers, the leaf will look like it came out from the branch directly and that it's moving by itself.

03 Create a Particle Flow system We have different options for creating a particle tree as discussed in the introduction. We are going to use the default particles in 3ds Max, which is Particle Flow – a totally event-based particle system. You can use Particle Flow Toolbox 2 and 3 to make this tree more realistic and advanced, but we're going to use a normal Particle Flow system to show you the basic setup. So let's start with dragging Particle Standard Flow in Event Display and remove unnecessary Operators, for example Speed and Rotation. Then make the Viewport visibility 100 per cent.

04 Create and modify Forces To build the branches, we need Forces to control the motion of particles that will create the branches. For that purpose we need two Forces – one is Wind and the second is Drag. Wind will be used to spread the particles in different motions and Wind Turbulence will help to create uneven shapes of branches. Drag will help to reduce the velocity of particles by a specific amount so we can control the spreading of our particle tree. So now we will modify Wind and Drag. We will use these parameters generally, but as we are making a tree we can change these parameters to what we want them to be. So let's start with Wind. We will use Planar Wind and set the Strength to 0.7, Wind Turbulence to 5.0 and Scale to 100.0. Now let's move to Drag. We will use Linear Damping, so set the X Axis to 50 per cent, Y Axis to 50 per cent and Z Axis to 100 per cent. This means our particles will spread more in the x and y axis than in the z axis.

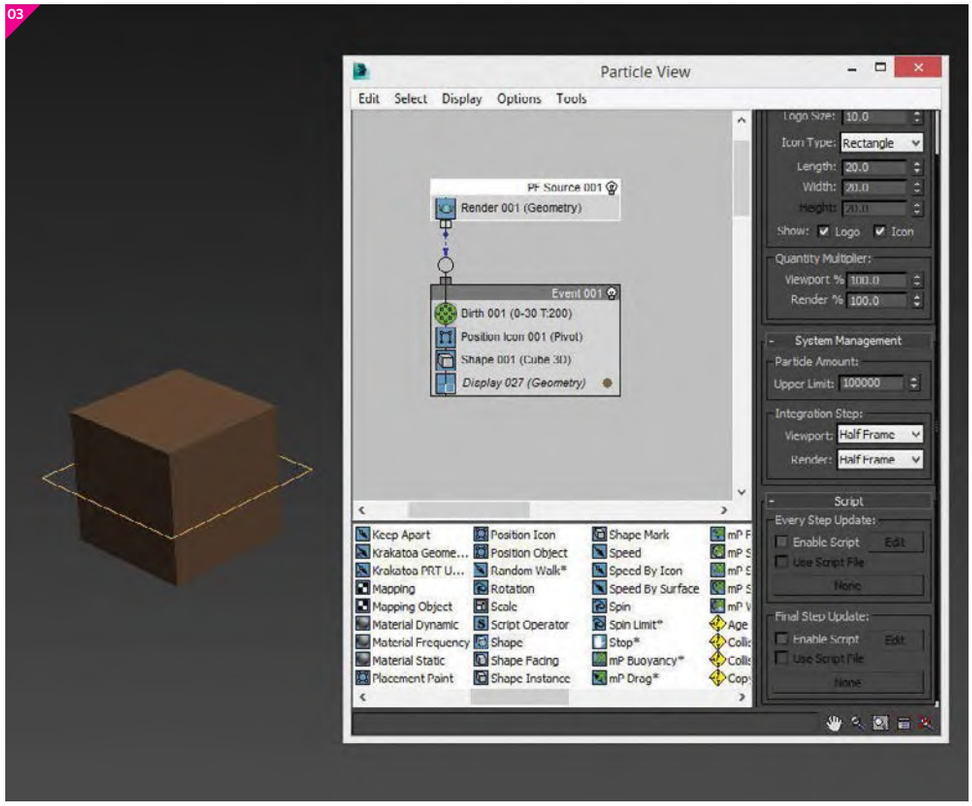
02



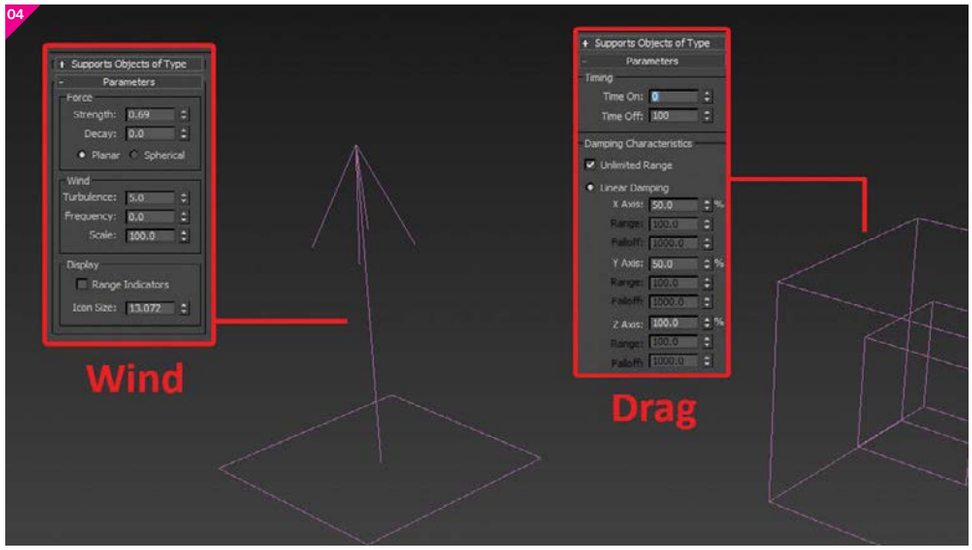
Use BlobMesh or Thinkbox Frost

In this tutorial we have used particles to create a tree, but as you can see all of the branches look like they have been made with particle geometry. To solve this problem you can use a BlobMesh compound object for all branch events, so that you get a single mesh for tree and leaves separately. You can also use a Thinkbox Frost plugin to create a mesh over the particles.

03



04



05 Modify the Particle system Even though the tree formation here is basic, it still has too many Events for creating this tree. To create different types of branches and leaves we will need different Events; our tree has a main branch, secondary branches, small branches and leaves. Let's start building our particle tree step by step. First we will create a main branch and for that we will modify our primary Event. So let's start with Birth. Make Start and Stop 0, and Amount 1. Then make Position Icon into a Location Pivot. Following that, add two Forces in the primary Event, and pick Drag in one Force and Wind in a second Force. Now change the Influence of Drag Force to 600 and keep the Wind Force as it is. Then select Shape and change it to Sphere 20-sides and Size to 15.0. Next, add Scale Operator into this Event and change the type to Relative Successive, the scale factor XYZ to 95 and the Bias to Towards Minimum. Now add Spawn to make the branch. Make it Travel by Distance and change the speed by setting everything to 0.0. Now just add a Display Event outside the primary Event and connect this Event to Spawn.

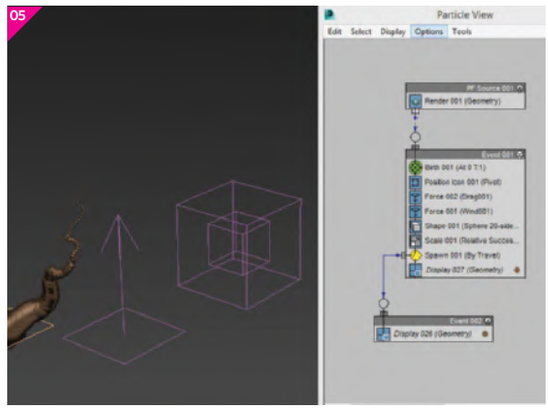
06 Secondary branches To create secondary branches, we have to shift to the next Event, but before that we have to add Age Test in our primary Event. So select Age Test, then make it Absolute Age and set the Test Value to 5. Now create a new Event (the second Event) for secondary branches and these will have Spawn. Increase the Offspring to 4, Speed Inherited to 100, Variation to 75 and Divergence to 20. Next, create the third Event which will connect to Spawn (the second Event). You have to copy Scale and both Forces from the primary Event to this Event and add Delete Operator with a Life Span of 30. Add Spawn below the Delete Operator and change it to By Travel Distance. Make the Step Size 0.3 and Speed Inherited, Variation and Divergence 0.0. Now create a Display Event (the fourth Event) outside the third Event to connect to Spawn (the third Event). Here we can begin to see the main branch and secondary branches.

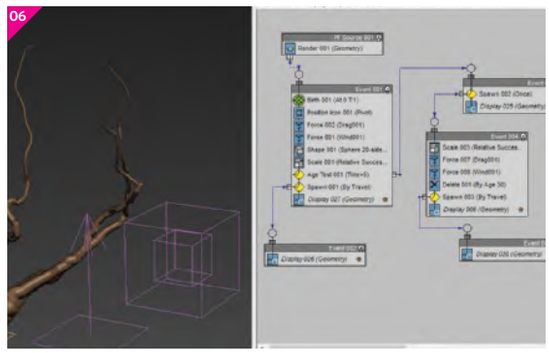
07 Small branches particle Events To create small branches, we have to shift to the next Event, but before that we have to add Split Amount in our fourth Event. So select Split Amount and set the Ratio at 5. Now create a new Event (the fifth Event) for small branches, which will have Spawn. Keep the Offspring at 1 and Speed Inherited at 100, Variation at 75 and Divergence at 20. Now let's create our sixth Event which will connect to Spawn (the fifth Event). Again you have to copy Scale and both Forces into this Event. Go to Scale and set the Scale Factor to 85, Drag Force to 700, Wind Force to 2,000 and then add a Delete operator with Life Span of 5. Add Spawn below the Delete operator and change it to 'By Travel Distance'. Make the Step Size 0.3 and Speed Inherited, Variation and Divergence 0.0. Now create a Display Event (the seventh Event) outside the sixth Event to connect to Spawn (the sixth Event), and here we can see the small branches.

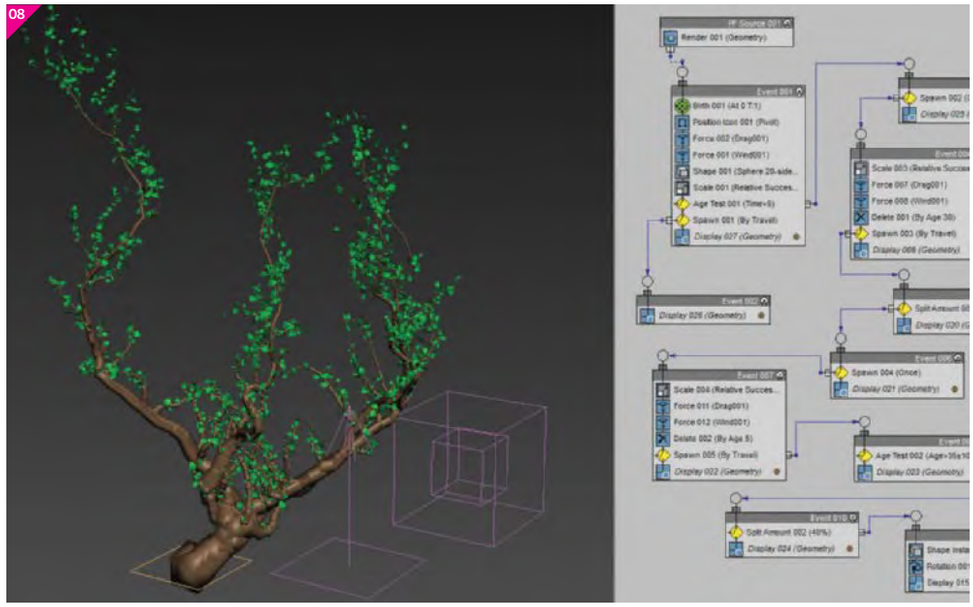
08 Leaves Particle Events To create leaves, we have to shift to the next Event, but before that we have to add Age Test in our seventh Event. So select Age Test and change the Test Value to 35 and Variation to 10. Create a new Event (the eighth Event) for Amount of Leaves, which will have Split Amount and change the Ratio to 40 per cent. Create the ninth Event to connect to Split Amount (the eighth Event). In this Event we have to add Shape Instance for our animated leaf and change the Scale to 7.0 and Variation to 40.0. Turn on the Animated Shape option and change Sync By to Event Duration. Here we can see the leaves. So this is a basic setup of particles for creating a tree. Make a quick preview, so we can see the tree formation.

Keep trying

One important thing is to try different parameters to make a more dynamic tree and carry this tree formation effect into the next level. For example, falling leaves or fruits can create seeds and from those seeds, new trees will form. Because of these effects, you will learn different techniques and Particle Flow Parameters – this will help you create different types of trees.







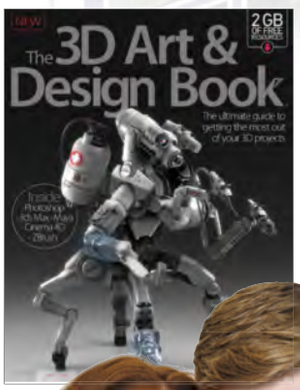
All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

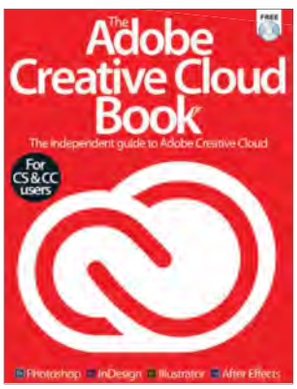
From the makers of 3DArtist

Fantasy ART

Why stick to the real world when you can take your art to a whole new level. The Fantasy Art Genius Guide takes you through creating mythical worlds, developing intricate characters and building terrifying monsters, all in one place.

Also available...





A world of content at your fingertips

Whether you love gaming, history, animals, photography, Photoshop, sci-fi or anything in between, every magazine and bookazine from Imagine Publishing is packed with expert advice and fascinating facts.

BUY YOUR COPY TODAY

Print edition available at www.imagineshop.co.uk

Digital edition available at www.greatdigitalmags.com

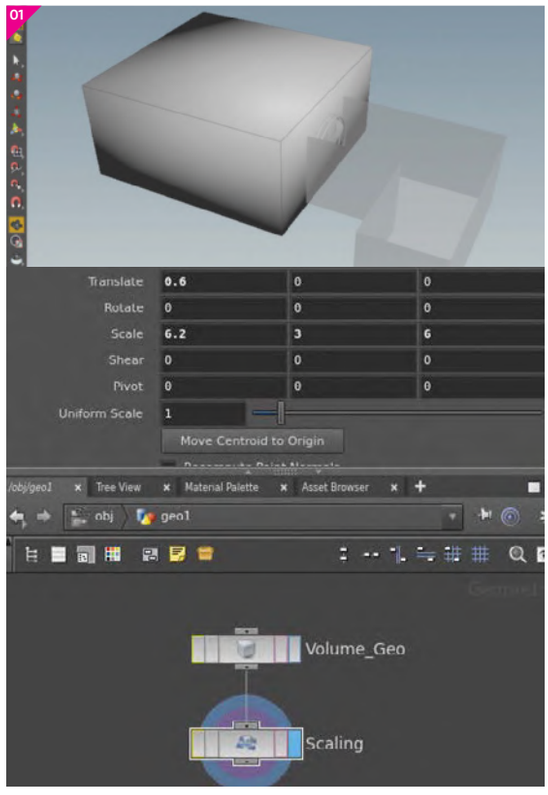
Print
Tablet
Phone
Desktop

HOUDINI

Create mood with volumetric lighting

There are several ways to create mood in your scene and the most powerful effect is definitely volumetric lighting. Even though lighting is part of the name, this effect focuses more on working on the actual volumes in terms of volume creation and adding some noise to it in the scene, instead of working on the lights themselves. We will dive into Houdini and investigate one major way to add volumetric lighting in a scene. We will start with the creation of geometry, which will be our base for the volume. By using an IsoOffset SOP we can convert the polygonal geometry to a uniform volume or a grid of voxels, where every voxel in the bounding box is set with a density of one. This mode is very important and we will set this to fog volume. Before we can actually work on the voxels, though, we need to create a new attribute and apply the name density, as this is a fixed naming convention for the next step.

Afterwards we dive into Volume VOPs and work directly on the voxel. The target of this procedure is to add a special kind of noise to the uniform volume to create an effect like atmospheric noise – a wisp-like dust effect. When the volume is in place then it is about time to place a light in the scene and set the correct attributes. This is especially true for the active radius, which is responsible for a significant performance boost. If there is no active radius that can be set then each tiny light will affect the sampling in the whole final image. Last but not least, we dive into the render settings and optimise the render speed for a balanced rendering time, render quality and the final image lighting quality.

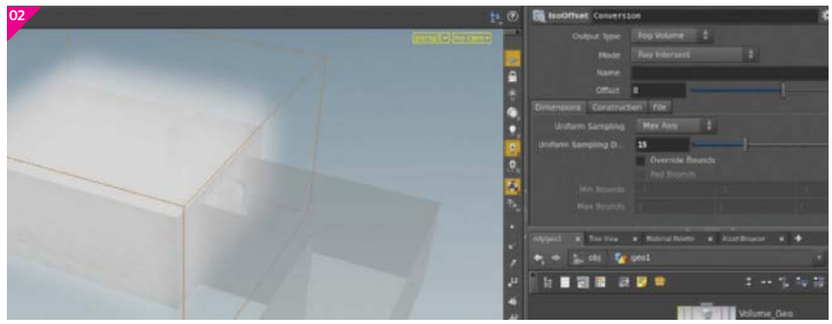


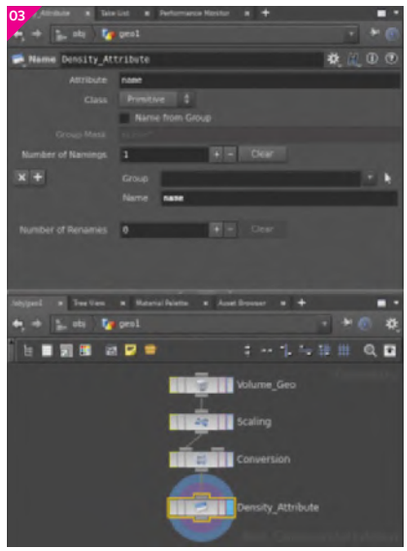
YOUR FREE DOWNLOADS
from **filesilo.co.uk/3dartist**
- Tutorial screenshots
- Tutorial video
- Scene file

01 Add a base for the volume Let's open the sample scene provided on FileSilo for this tutorial. You will see a room with a vent system next to a room. First we create a polygonal box which surrounds the room. In the network editor pane create a geometry node, delete the inside node and add a box node. To put the box on the grid, copy the Y parameter in the size line and paste the relative reference to the centre line in the Y field. Afterwards we must divide it by a factor of two, and via a transform node we scale the box to fit the room.

02 Convert geometry to a volume One of the most useful SOPs in Houdini is the IsoOffset SOP, which will help to convert the polygon box to a volume. We can use the implicit function to create fog volume out of watertight geometry. Let's append an IsoOffset SOP to the transform node. Now choose fog volume as output type. In the next line it's necessary to set the mode for creating a signed distance field to intersect the ray. To save time during the rendering just decrease the uniform sampling divisions to a value of around 15, depending on your machine.

03 Understand volume What makes a volume a volume? Well it's not just the voxel but also the density attribute for each voxel. Usually the IsoOffset SOP gives all voxels an attribute with a value of one. To make it accessible for modifications we have to create a density attribute. To do that we append a name SOP to the IsoOffset SOP. Under the line name we type in 'density'. Now we have given the input primitive, or better the voxel, a density attribute. You can middle-click the name node and see that next to the voxel resolution is where the density lies.



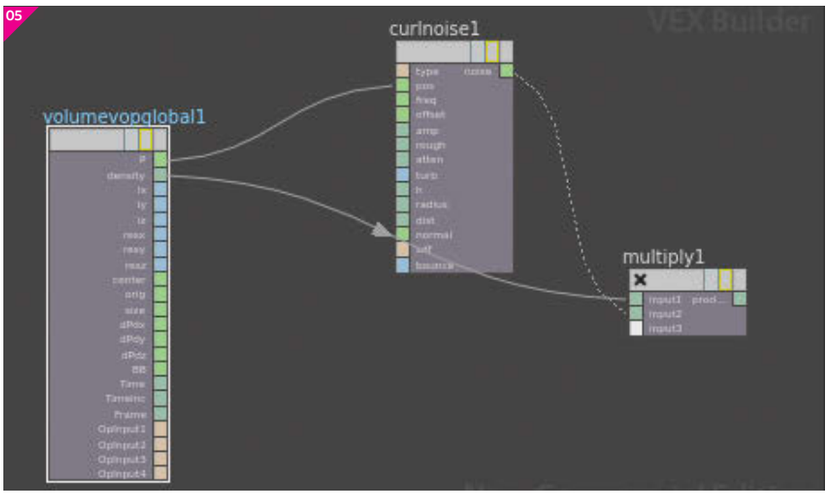


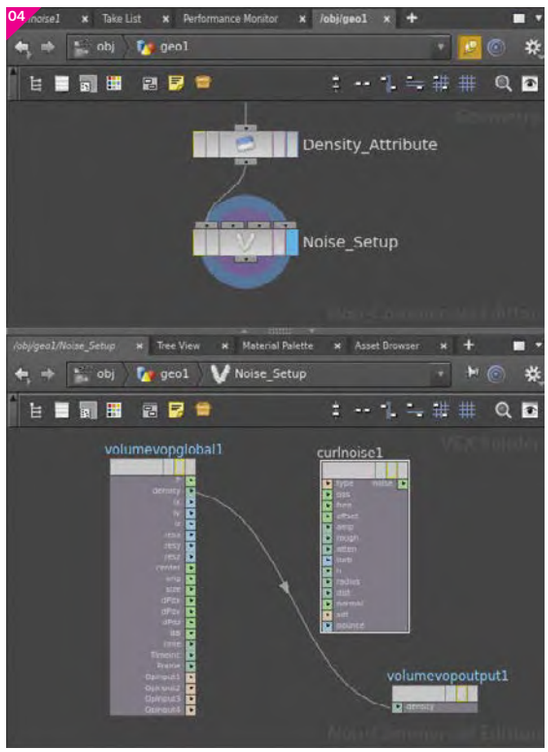
Saving memory using OpenVDB

The magic behind the OpenVDB format is the way in which the sparse volume data is represented – it's very memory efficient! This means that an empty voxel with a zero value (voxels are equal to the background colour) don't take any physical memory. If you want to create smoke or wispy fog, then OpenVDB must be your choice. The VDB tools in Houdini let you create volumes out of watertight geometry and even particles plus particle fluids. Use the VDB from the Polygon SOP Node and activate the Fog VDB line to get the density field.

04 Work on the voxel To work directly on the voxel we have to append a Volume VOP SOP. The important thing at this step is that we defined the density attribute for the voxel beforehand. This is because in this SOP – which is designated to work with volumes – we have a special density output for each voxel at its location. The main slots that we will use are the P – point position slot – and the density slots. In this new SOP we create a Curl Noise VOP first. The Curl Noise gives us more control over the upcoming noise effect.

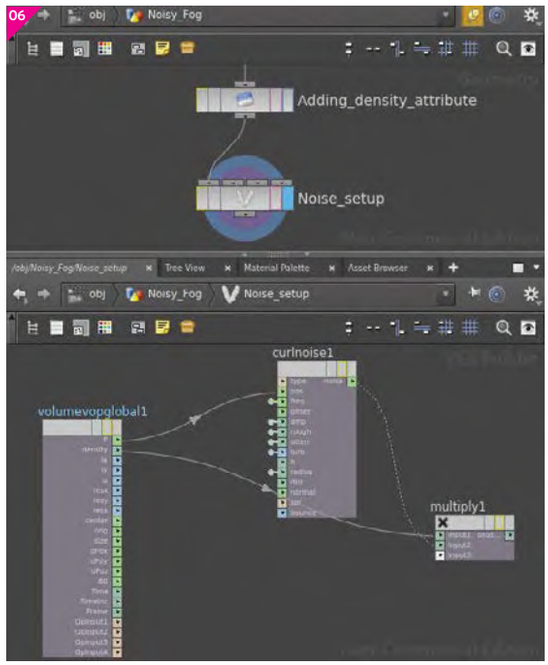
05 Prepare the noise setup It's important to understand how the setup will work in the Volume VOP SOP. Let's connect the P slot of the global attributes with the position slot of the noise. Now we create a multiply node and place it behind the Curl Noise. At first we connect the density of the globals with the first multiply input. That defines the output type. Afterwards we plug the Curl Noise output to the second multiply slot. With this setup we take each voxel and multiply it with the corresponding noise value at the respective voxel location to vary the density.





> To save time during the rendering just decrease the uniform sampling divisions to a value of around 15

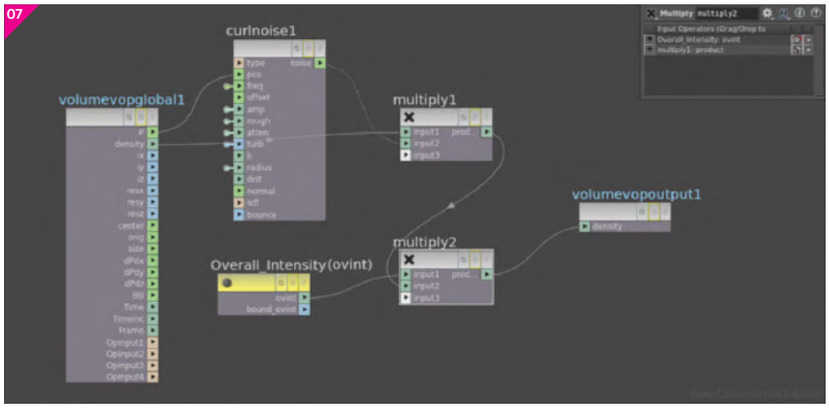
06 Make noise parameter accessible Let's connect the end of the multiply node with the Volume VOP output to make the wiring work. We are still in the Volume VOP context and if we want to access all noise parameters through the upper level we have to promote the parameter. The easiest way to promote a parameter is to press the middle-mouse button on the respective slot. We will do this for the frequency, amplitude, roughness, attenuation, turbulence and the radius. If we move out of the Volume VOP SOP you will see all of the parameters available by just left-clicking the SOP.

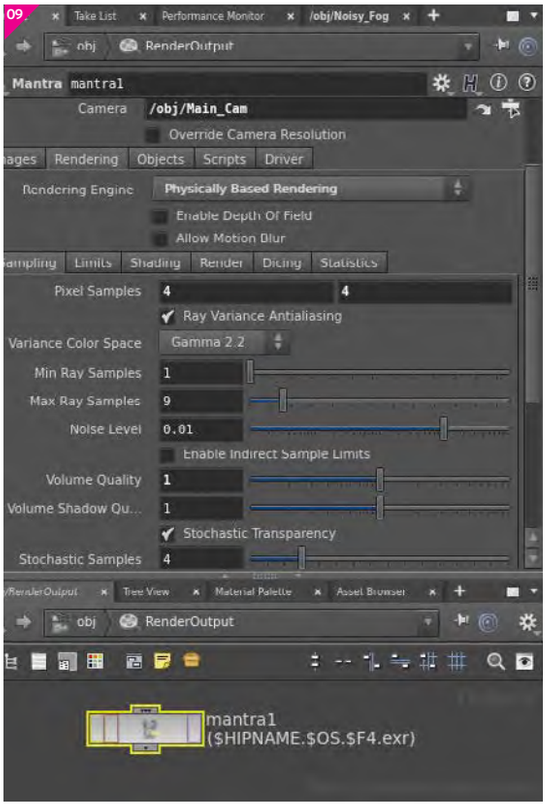


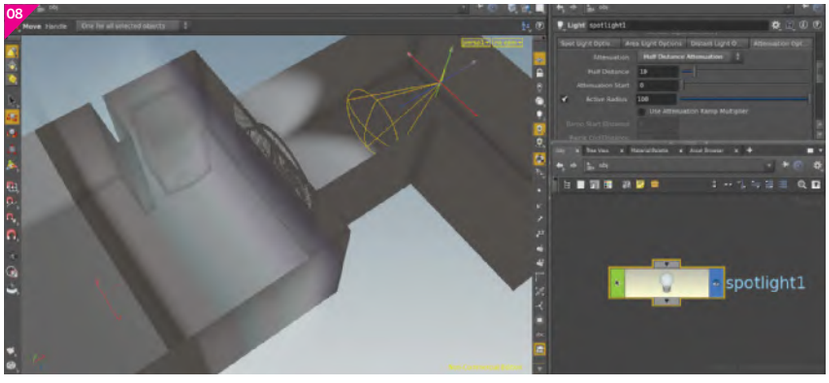
07 Create a global density multiplier At this stage we have a working Curl Noise with all parameters accessible to us. But it would be nice to have a simple global density multiplier to control all voxels at one time with just one parameter. Back in the Volume VOP SOP we must create another multiply node and a parameter node. It doesn't really matter what we plug in at first to the new multiply node, so we start with the first multiply node and add the new parameter node as second. The output will be connected to the global output. Let's name the parameter 'ovint' and label it as overall intensity.

08 Light creation with active radius The main light of choice is a spotlight from the shelf to imitate an industrial light. After placing it in a correct position, it is necessary to know what makes the light so effective. First we jump into the Attenuation tab within the Light tab and activate half distance attenuation. This is also a great method for imitating floodlights. The important thing here is the flag at active radius, which is where we set a value to (almost) fit the half-distance attenuation. This is so that objects far away from this light source won't receive any lighting, which results in less samples during rendering time.

09 Render the scene Now it is time to render the volumes in the scene. We create a ROP network with a new mantra node inside in the network editor pane on OBJ level. The first parameter change on the mantra attributes is the switch to PBR rendering. After that we increase the volume quality to a value of one. Now it's time to play around – a higher number for the pixel samples will decrease the detail in the shadows and thin out the volume. But a higher value for the volume quality (with reduced pixel samples) will create a thicker smoke as well as more contrast through deeper shadows.







Volume creation through a shader

There is another way of creating volumes by converting polygonal geometry – by utilising the uniform volume shader. Anchored in the material library is the predefined uniform volume shader. To apply the shader simply add it into the respective SHOP network, select your geometry node in the network editor pane and switch to the Material tab. Here you can assign the material in the material slot. All necessary parameters to control the density are located in the volume material node and even a noise generation tool is available, as well as some displacement options.

SPECIAL OVERSEAS OFFER

SAVE UP TO 17% ON A GIFT SUBSCRIPTION THIS CHRISTMAS

ALL TITLES JUST £49.99

REAL CRIME
50 SHADES GONE WRONG
BETRAYAL IN BOSTON
MURDER IN THE OUTBACK
TWO BRITISH BACKPACKERS MEET A STRANGER ON THE ROAD. ONLY ONE MAKES IT HOME ALIVE

REAL CRIME
Uncover the most fascinating and notorious true crimes in history
13 issues, save 4%

HOW IT WORKS
The action-packed science and technology magazine
13 issues, save 10%

- **EXCLUSIVE CHRISTMAS OFFER**
- **SAVE UP TO 17%** ON THE SHOP PRICE
- NEVER MISS AN ISSUE OF **YOUR FAVOURITE MAGAZINE**
- **FREE E-CARD** TO SEND WHEN YOU BUY AS A GIFT
- **IDEAL CHRISTMAS GIFT** - THAT LASTS ALL YEAR

ALL ABOUT HISTORY
Bringing history to life for the whole family
13 issues, save 15%

GADGET
Packed with the latest, coolest and most exciting tech
12 issues, save 17%

WORLD OF ANIMALS
Everything you need to know about the world's most amazing wildlife
13 issues, save 4%

HISTORY OF WAR
The stories, strategies, heroes and machines of historic conflicts
12 issues, save 17%

DIGITAL PHOTOGRAPHER
Inspiration, tutorials and tools for enthusiasts and professionals
12 issues, save 17%

RETRO GAMER
The number one magazine for classic gaming
12 issues, save 17%

ALL ABOUT SPACE
Discover the wonders of the solar system and beyond
13 issues, save 15%

SCIFINOW
The number one magazine for sci-fi, fantasy and horror fans
12 issues, save 17%

FIND OUR FULL RANGE OF TITLES AT THIS **GREAT PRICE ONLINE!**

ONLINE AT

www.imaginesubs.co.uk/xmas151

ORDER HOTLINE

+44 (0)1795 592 869

BUY AS A GIFT OR TREAT YOURSELF!

Use code **XMAS151** for this extra-special price.

WANT MORE?

Go to **GreatDigitalMags.com** and get great deals on brilliant back issues & exclusive special editions

INSTANT ACCESS TO BACK ISSUES

PLUS SAVE EVEN MORE IF YOU SUBSCRIBE

EXCLUSIVE
BOOKS & SPECIAL EDITIONS

★ GO TO GREATDIGITALMAGS.COM NOW ★

ALL AVAILABLE TODAY ON
GREATDIGITALMAGS.COM

PNY Nvidia Quadro M5000

Nvidia manages to squeeze more performance from less hardware with this new high-end GPU

The M5000 is the second new Nvidia graphics card this month, similarly upgraded and updated with the Maxwell architecture. As with the M4000 and M6000, Nvidia's approach has been a re-engineering of existing resources, rather than throwing in a huge amount of new rendering hardware.

It's a very important card for Nvidia. The top-end M6000 is a lovely piece of hardware, but it costs an astronomical sum (around £4,000) that can easily push the total cost of a workstation to over £10,000 – including a similarly high-end processor configuration. At £1,500 the M5000 is a more realistic option, if still pricey.

Physically the card is almost the same as the older K5200. A single six-pin power connector is all you'll need for it, and the cooler is the same two-slot design. At the back it's a bit more interesting though, with four DisplayPort 1.2 outputs and arguably this is the only way to go now, as the standard supports 4K at 60Hz – although there is still a single DVI connector for backwards compatibility. With the move to Maxwell, the M5000 has had cuts in a few areas of the hardware to make room for improvement in others.

The shader count has been reduced to 2,048 from the 2,304 in the K5200. This is in stark contrast to the other two Maxwell-based cards, both of which featured a (slim) increased shader count over their predecessors. GDDR5 memory remains the same at 8GB and the memory bus stays at 256-bit. Likewise, there are fewer TMUs, down from 192 in the K5200 to 170 in the M5000.

It's not all austerity measures. As in the M4000, there's now twice the number of ROPs and the memory speed has been raised to 1,653MHz (6,612MHz effective). This is the same as the M6000 and is up 10 per cent on the K5200. But the biggest leap is in the overall clock speed, raised to 861 MHz – a full 25 per cent boost over the K5200. This contributes to a doubling of the pixel fill rate from 21.3 to 55.1 gigapixels a second.

The reason for this rearrangement is down to one crucial aspect of any graphics card – the TDP, which remains at the same 150w for the M5000 as its predecessor. This affects the requirements of the cooling system and the power draw, which for Quadros is generally lower than AMD's FirePro cards. It governs whether OEMs can squeeze a card into a specific workstation and therefore affects a great deal of Nvidia's business.

With much faster clock speeds, slightly more memory bandwidth and slightly fewer shaders, benchmark improvements vary from a very impressive doubling of performance over the K5200, to a smaller overall gain, none at all or even a small drop.

MAIN Better OpenCL performance is the biggest news with all of the M-series cards

The biggest and most noticeable improvement, as with all the other Maxwell-generation cards, is with OpenCL. Both LuxMark and the CompuBenchCL benchmark suite saw gains between 50 and 100 per cent over the K5200, confirming that the FirePro is no longer the card of choice if your workflow involves software that depends on OpenCL.

Until now, Nvidia's focus has been mainly on its own CUDA API used by some, but not all, rendering tools. OpenCL support had been neglected, leaving AMD with a strong lead in that area. But what if you need both? AMD doesn't support CUDA, but going with a Quadro meant worse performance. Now Nvidia has solved that problem, leaving AMD without one of its USPs.

But with the M5000, not every test shows large gains. CUDA results from the ArionBench tool fall slightly short of the older K5200, with a result of 1457 compared with 1476 before. This is very disappointing news for anyone who uses CUDA-based software and was hoping to see some improvement in this area.

It's generally more positive news with SPECviewperf, which relies on traces of real-world 3D applications, although the increased performance varies here as well. Some results in the engineering tests are triple those of the K5200, but the sw-03 (SolidWorks) simulation shows a gain of just under 20 per cent with 33 per cent gains in the Maya section.

Good results, but not an earth-shattering improvement. OpenCL users who want an Nvidia card will be very pleased, but the overall gains are fairly modest. Nvidia's Pascal architecture is due to replace Maxwell, and should be moving on from 28nm but first with new gaming cards in mid-2016. While we'll have to wait a long while until we see another Quadro generation, we're hoping it offers a bigger performance boost across the board.

Orestis Bastounis

BELOW The M5000 may have less CUDA cores than the K5200 but it has double the ROPs

> As in the M4000, there's now twice the number of ROPs and the memory speed has been raised to 1,653MHz (6,612MHz effective)

RIGHT The card's physical size and shape is just about identical to the K5200

BELOW Without a shrink from the existing 28nm process, it's been tough for Nvidia to achieve huge performance gains

ABOVE An ultraquiet active fansink is a regular feature in the Quadro cards

Essential info

Price	£1,500
Website	nvidia.co.uk/object/quadro-desktop-gpus-uk.html
Shaders	2,048
Memory	8GB GDDR5
Clock speed	861MHz
Memory speed	1653MHz
Power connector	6 pin

Summary

Features ★★★★☆
Performance ★★★½☆
Design ★★★★☆
Value for money ★★★½☆

Verdict ★★★★☆

A great choice for a high-end card and very powerful, but perhaps not an essential upgrade

PNY Nvidia Quadro M4000

Nvidia's new mid-range Quadro offers the best value for money of any professional GPU sold by the company

RIGHT The M4000 is the most powerful single-slot Quadro card

Judging by the popularity of its predecessor, the K4200, you should expect to see Nvidia's Quadro M4000 graphics card show up in plenty of workstations in the next year or so. It's bound to be a popular choice, as it occupies the same sweet spot in the middle of the Quadro line-up. You get a considerable amount of graphics performance but without the enormous price tag of the more high-end cards.

It's popular for another reason. It's the most powerful Nvidia GPU with a cooler that allows it to fit into a single slot inside a case. Although that's not a restriction for systems that are sold in large, high-end cases, many are sold with slim custom designs, particularly mid-range machines from the likes of Dell and HP. Often when trying to customise a workstation with a more high-end GPU, a single-slot card like the K4200 is the most you're offered.

Its replacement uses the Maxwell architecture, as found in all of Nvidia's 9-series gaming GPUs. Until now though, the only professional card to use this new design is the ultraexpensive Quadro M6000, which came out earlier this year. That card surprised in many ways, as it has the same amount of memory as the K6000 it replaced – a minor increase to the shader count and the same memory bandwidth but with increased overall performance. The real performance gains came from more ROPs, faster memory and a higher core clock speed.

Of all the Quadro upgrades to a Maxwell-based architecture, relatively, the M4000 has gained the most over the K4200. The GDDR5 memory has been doubled to 8GB, running at a faster 1,500MHz memory clock frequency. The ROPs have also been doubled to 64. There are more TMUs and around 25 per cent more stream processors, from 1,340 up to 1,664. It's a bigger upgrade than the M5000 is over the K5200.

And as expected, the benchmark results reveal the fruits of this added hardware. We unfortunately didn't have a K4200 to directly compare with the M4000, but we do have results from other systems and we can look at how it fits in with the M5000 and K5200.

The story is roughly the same as it is with the M5000 and M6000 – greatly improved OpenCL results and smaller improvements in other tests.

The OpenCL numbers are particularly impressive. The LuxMark results leapfrog even the K5200, which carries a price tag that's twice the size. It's not a one-off either, as CompuBenchCL shows a big improvement too. In fact the £750 M4000 starts to look really impressive when you compare it with the £1,500 K5200 and, arguably, perhaps even the M5000 as well. SPECviewperf scores are improved across the board and are almost at the same level as the K5200. It's a two per cent difference here or five per cent there – impressive, since this card costs half as much.

But given the M5000 is a solid but fairly slim upgrade over the K5200 (see the review on the previous page) you begin to wonder if the added expense of the M5000 is worth it. For most people out there a £750 difference is no small change, and the two cards now have the same memory capacity, which will mean one less barrier to 3D applications at 4K resolution.

Let's look at the figures. In LuxMark 3.0's OpenCL LuxBall test the M4000 scores 7943, the K5200 gets 6430 and the M5000 10418. This is a difference of 30 per cent or so.

Of course the M5000 is faster as it offers a better overall specification. In sw-03 in SPECviewperf the M4000 scores 98.88, the K5200 scores 104.63 and the M5000 gets a score of 122.72. Again, this is about a 25 per cent performance difference. That's a percentage that is worth it for some, but perhaps not so much for others, given that there is a notable price difference

> It's the most powerful Nvidia GPU with a cooler that allows it to fit into a single slot inside a case

BELOW There's no PNY branding anywhere on the card

and this is a subject that's a worthy topic of debate among digital artists.

It's also a nightmare for any technology company, making their own mid-range product so good it seriously cannibalises sales of the pricier model. Nvidia probably isn't actually worried as the M5000 will most likely sell very well anyway, but even raising the question shows how the M4000 is the true shining light in Nvidia's new Maxwell Quadro line-up.

Orestis Bastounis

RIGHT The TDP has gone up slightly from 108 watts to 120 watts

BELOW As the Kepler-based K2200 is now looking a bit old, the M4000 is a really good upgrade for artists

FAR BELOW The M4000's shaders are slightly less than the M500 at 1,664

Essential info

Price	£749
Website	nvidia.co.uk/object/quadro-desktop-gpus-uk.html
Processors	1,664
---Memory	8GB GDDR5
Clock speed	773MHz
Memory speed	1,503MHz
Power connector	6 pin

Summary

Features ★★★★★
Performance ★★★★½
Design ★★★★½
Value for money ★★★★½

Verdict ★★★★☆

Mid-range workstations just became a lot more powerful

Cinema 4D R17

This new release has great workflow improvements and the addition of some solid Spline tools

Maxon's latest milestone release of Cinema 4D promises to be "faster", "easier" and "more realistic". Workflows are now paramount to Cinema 4D R17, with new and killer features like the Take System at the forefront of Maxon's push. We'll be testing out all the latest features in the new iteration with our own project.

We start by using a standard head mesh from the C4D library with a plane. This will be useful as a background and as support for the area just behind the ears of the character.

To build the scene, we create a camera and choose an angle that we like. The Pen tool now has four configurations: Pen, Sketch, Spline Smooth and Arc Tool. Each of these can do some amazing things; we used the Sketch tool, which enables us to draw shapes freely. The Magnetism menu is then enabled with a polygon shape activated. Now we can draw and the spline emitted will stick onto the polygons shown in the viewport. Just imagine the possibilities available with this feature!

In the parameters of the new Sketch tool, you can decide if you want to draw new splines every time you finish a line or if you want to keep every line in the same spline layer. It's very handy for if you decide to do several layers. We then use the Sweep tool with a small thickness for each spline, which will now produce ribbons.

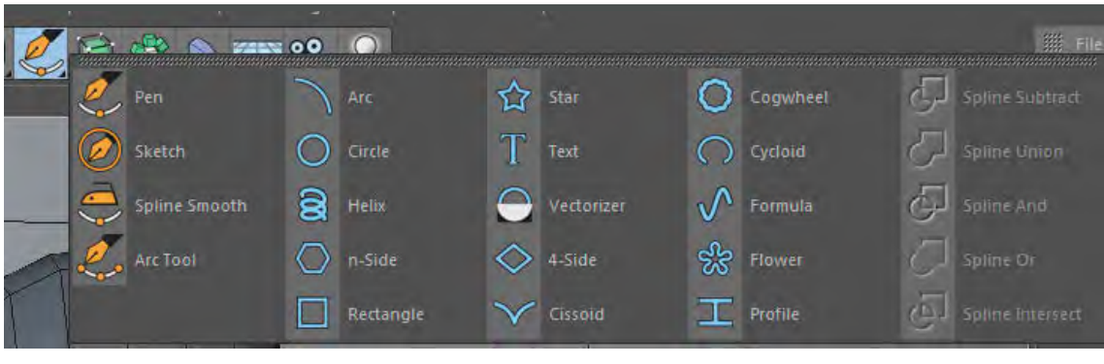
Maxon added two new effectors for when you finish working with your splines. You can, like in Adobe Illustrator, inflate them, move them, curve them, split them and do more to make it look how you want. Before that, we were always drawing splines in Illustrator because the Bezier tool there was better. Now we can use the Bezier tool in Cinema 4D that, to us, seems even better than the Illustrator version.

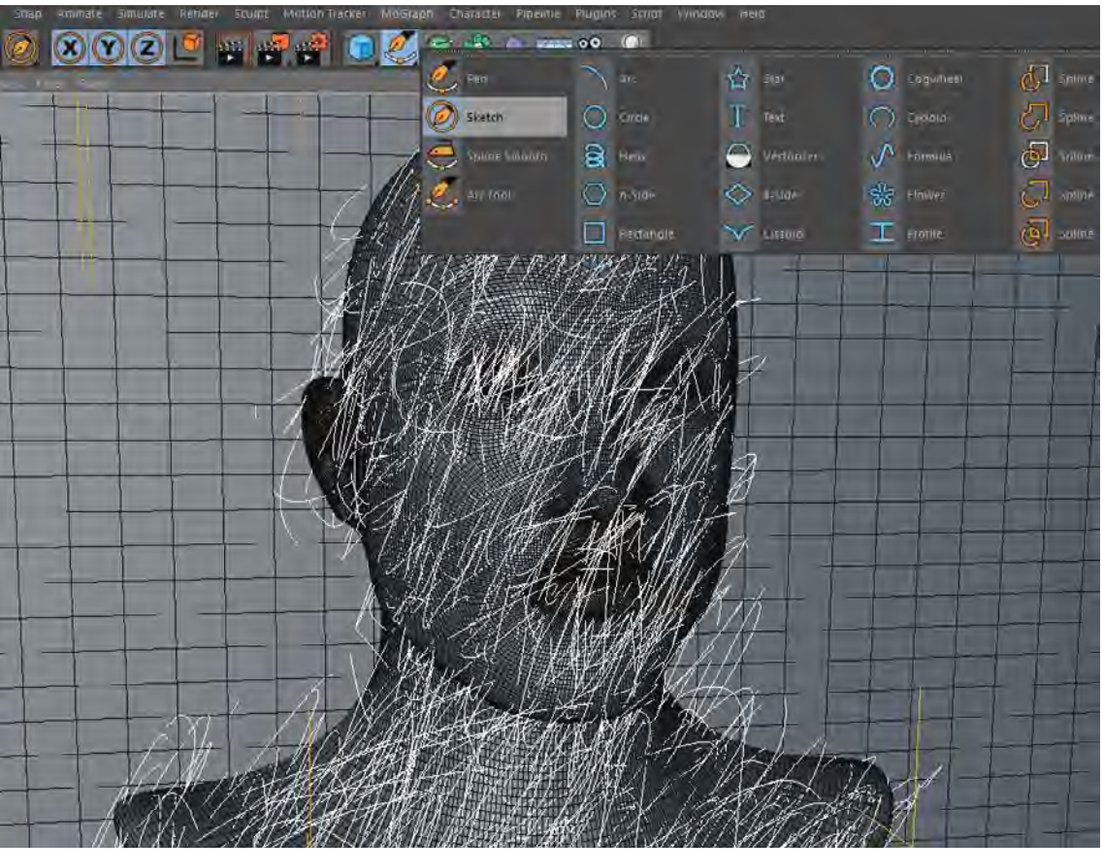
Now we look at Materials, where there is a brand-new colour picker called Color Chooser that makes it very easy to get the colour that you want. Testing out the new Variation Shader (in the Effect menu) gives you many colours that you can tweak. We tried to put it directly onto the main layer, which contains all of our sweeps, but it didn't work. It worked when we put it on each layer though (you can put it on a cloner too – it will do the job).

We then tried some tests renders, and decided finally to stay with a simple white material. After that, we were finally able to try the new Take System – a huge feature in R17. No more dozens of files needed for production! Well done Maxon! On the right of the Panel menu, you can switch to Take where you can record and create new Take layers.

ABOVE Our finished project. When you enable the polygon snap, you can draw directly onto the surface of your mesh

BELOW The Pen tool now has four parameters, including a useful Sketch tool and new Spline solutions to choose from

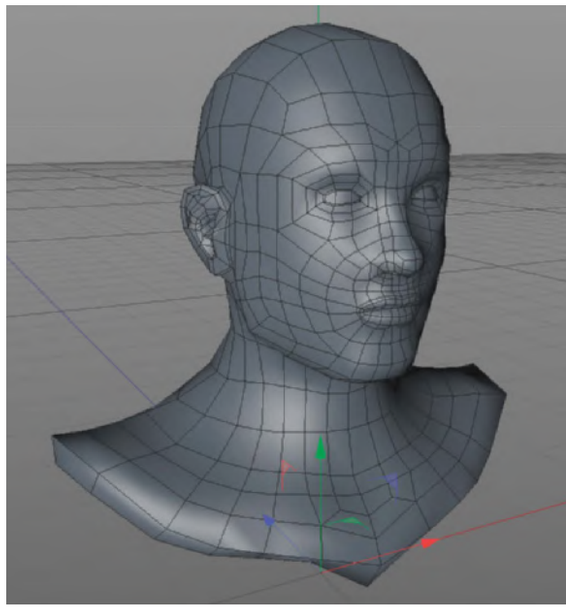




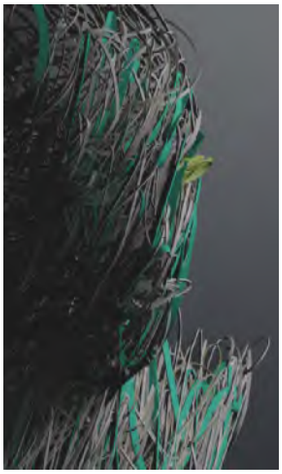
> We were finally able to try the new Take System – a huge feature in R17. No more dozens of files needed for production! Well done Maxon!

LEFT To make this kind of effect in R17, you have to both select the Sketch tool and activate a polygon snap

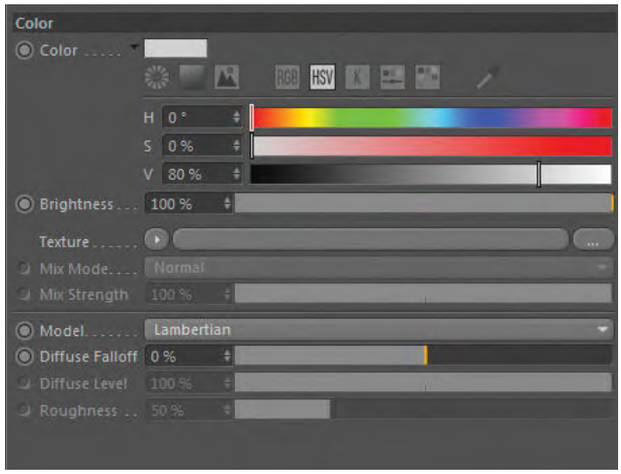
BELOW Our base mesh head from the Cinema 4D library, on which we used the Sketch tool



BOTTOM LEFT The new variation shader will bring a lot of colour into your cloner objects



BOTTOM RIGHT The new colour picker may seem like a small feature, but it is also very important



For each Take you create, there will be an individual recording of all the changes that you may make with textures, lights, parameters and objects. You can record a chair with a concrete floor on your first Take with GI on, on another Take get a couch with a wooden floor without GI, switch between the two and then render them with one click, all in the same file. Production will love this few feature!

This new release has really brought about some new tools that will increase creativity and aid workflow. The Spline tools are finally here and ready to rock, and all of the big (and small) changes in R17 will make your life easier.

In addition to the new integrations with Houdini Engine and SketchUp files, Cinema 4D is now a really powerful sculpting and modelling tool that brings you everything that you will need to create what you want.

On the other hand, we're still waiting for a brand-new BodyPaint and UV system (which have both been Cinema 4D's best features in the past few years), a water simulator and a way to export ZBrush FiberMesh and use them with Hair. That would be heaven. Maybe this will be something to look out for in the R18 release!

Nicolas Delille

Essential info

Price	From £660 / $995 for a Studio upgrade
Website	maxon.net
OS	Windows 7 64-bit, Windows 8 and 8.1 64-bit / Mac OS X 10.8.5
CPU	Intel Pentium 4 and Athlon 6 and up for Windows / Intel Core 2 Solo for Mac
Graphics card	OpenGL 3.2-capable cards recommended

Summary

★★★★½ **Features**
★★★★★ **Performance**
★★★★★ **Design**
★★★★½ **Value for money**

Verdict ★★★★½

Cinema 4D R17 is worth buying for the Take System and the Pen tool alone

SAVE UP TO 50% ON A GIFT SUBSCRIPTION THIS CHRISTMAS*

WIN £10,000 WORTH OF SOFTWARE
MODO • HOUDINI • V-RAY AND MORE
Practical inspiration for
www.3DArtistonline.com
85
3DArtist
SCI-FI
FROM CONCEPT TO RENDER
Discover new species and new worlds over 39 pages of incredible tuition
BUILD A MECH WOLF
Develop unique futuristic machines
3DS MAX COMIC BOOKS
Stylise your vehicle designs in only 13 steps
ACHIEVE HEROIC RENDERS
PAGE 70
JUST £29.99
25 KEYSHOT TIPS & TRICKS
Experts teach you how to get the best out of the renderer
3D printing Destiny
Model and print your own game assets
Cyberpunk characters
Learn to use ZBrush to develop your ideas

10 ISSUES, SAVE 50%

GADGET
Packed with the latest, coolest and most exciting tech
12 issues, save 50%

HOW IT WORKS
The action-packed science and technology magazine
13 issues, save 46%

ALL ABOUT HISTORY
Bringing history to life for the whole family
13 issues, save 49%

HISTORY OF WAR
The stories, strategies, heroes and machines of historic conflicts
12 issues, save 50%

DIGITAL PHOTOGRAPHER
Inspiration, tutorials and tools for enthusiasts and professionals
12 issues, save 50%

RETRO GAMER
The number one magazine for classic gaming
12 issues, save 50%

ALL ABOUT SPACE
Discover the wonders of the solar system and beyond
13 issues, save 49%

SCIFINOW
The number one magazine for sci-fi, fantasy and horror fans
12 issues, save 50%

ORDER HOTLINE **0844 856 0644****
ONLINE AT **www.imaginesubs.co.uk/xmas151**

SUBSCRIBE TO ANY MAGAZINE FOR JUST £29.99

- Exclusive **Christmas offer**
- Save **up to 50%** on the shop price*
- Never miss an issue of your **favourite magazine**
- **Free delivery**, direct to your door
- **Ideal Christmas gift** - that lasts all year!
- **Free e-card** to send when you buy as a gift

BUY AS A GIFT OR TREAT YOURSELF!

Use code XMAS151 for this extra-special price.

Order by 2nd December to start your subscription the first issue after Christmas.

** Calls will cost 7p per minute plus your telephone company's access charge.

BY POST

Send your completed form to:
Imagine Subscriptions, 800 Guillat Avenue, Kent Science Park, Sittingbourne, Kent ME9 8GU

YOUR DETAILS

Title_____First name_____
Surname_____
Address_____
_____
_____
Postcode_____Country_____
Telephone number_____
Mobile number_____
Email address_____
This subscription is ☐ for me ☐ a gift

DELIVERY DETAILS (IF DIFFERENT FROM ABOVE)

Title_____First name_____
Surname_____
Address_____
_____
_____
Postcode_____Country_____
Telephone number_____

PAYMENT DETAILS

UK £29.99 Magazine name_____

FOR MULTIPLE ORDERS PLEASE CALL THE ORDER HOTLINE **0844 856 0644****

CHEQUE

☐ I enclose a cheque for £_____
(made payable to Imagine Publishing Ltd)

CREDIT/DEBIT CARD

☐ Visa ☐ Mastercard ☐ Amex ☐ Maestro

Card number ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

Expiry date ☐☐ ☐☐

Issue number (Maestro) ☐ ☐

Signed _____

Date _____

All subscribers receive a monthly e-newsletter of news and offers.

Please tick if you would prefer not to receive any promotional material from Imagine Publishing:

by post ☐ by telephone ☐ by email ☐

Please tick if you would prefer not to receive any promotional material from other companies

by post ☐ by telephone ☐ by email ☐

Please tick if you DO wish to receive such information by email ☐

TERMS & CONDITIONS

* Titles are priced at £29.99 saving up to 50% on the shop price. For the full list of titles and issue details please visit **www.imaginesubs.co.uk/XMAS151.** This is a UK-only offer, for overseas offers please visit **www.imaginesubs.co.uk/XMAS151** or call **+44 (0)1795 592 869.** Gift subscriptions ordered by 2nd December will begin with the first issue on sale January 2015 – orders after this date will start with the following issue. You have the option of sending a digital gift card so please include your email address in the form above. Non-gift subscriptions will start with the next available issue.
Offer ends 31st December 2015. Promo code XMAS151

DISCOVER THE LATEST AND GREATEST GADGETS AND EXPLORE THE TECH INSIDE

TRY 3 ISSUES FOR JUST £1!

BRAND NEW FROM THE MAKERS OF HOW IT WORKS

Every issue packed with

The latest tech Everything from hoverboards, drones, wearables, sports tech, smart homes and more...

Buying advice New and cool kit and where to get it

Tech teardowns Under the skin of the latest gadgets

and more ...

CALL THE ORDER HOTLINE

0844 249 0270*

OR ORDER ONLINE

imaginesubs.co.uk/gadget

and enter code NEW15T

*Calls will cost 7p per minute plus your telephone company's access charge. Please use code NEW15T. This offer entitles new UK Direct Debit subscribers to receive their first 3 issues for £1. After these issues standard subscription charges will apply; currently £15 every 6 issues. New subscriptions will start with the next available issue. Details of the Direct Debit Guarantee available on request. This offer expires 31st December 2015.

The Hub

The inside guide to industry news, VFX studios, expert opinions and the 3D community

086 Community News

SIGGRAPH Asia 2015 rundown

The computer graphics conference heads to Kobe, Japan for 2015. Plus, we've got Pixar in a Box, a new online training academy

088 Industry News

Houdini 15

Side Effects marks its second release of 2015 with a raft of new features, Microsoft buys the Havok game engine and more

090 Project Focus

Halo 5: Guardians

Axis Animation reveals how it delivered cinematic excellence to the Xbox One's killer app

092 Industry Insider

Dominic Davenport

We speak to the head of Escape Studios about how the VFX school is cultivating the next generation of industry talent

094 Readers' Gallery

Reader's Gallery

The latest images created by the **3dartistonline.com** community

To advertise in **The Hub** please contact Simon Hall on **01202 586415** or **simon.hall@imagine-publishing.co.uk**

SIGGRAPH Asia 2015 festival preview

The eighth SIGGRAPH Asia returns to Japan for the annual global gathering of top names in graphics, animation, art and technology

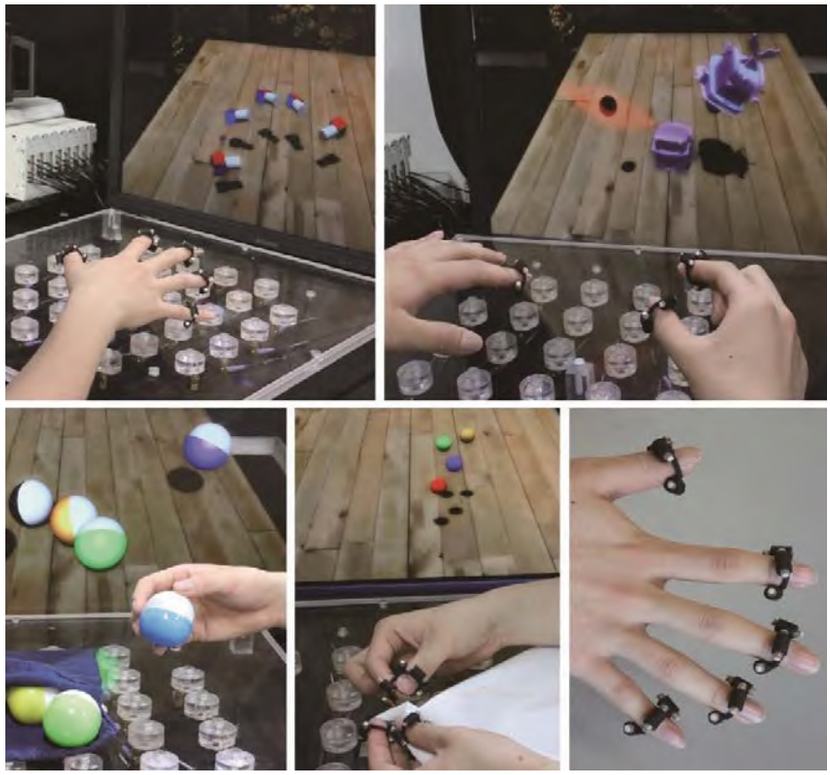
ABOVE Emerging Tech Transform Table with Yusuke Asari, Kazuki Takashima and Yoshifumi Kitamura

For 2015's SIGGRAPH Asia event, 3D Artist caught up with conference chair Yoshifumi Kitamura and Computer Animation Festival director Jinny HJ Choo for a preview of what to expect at this year's edition. "I have [especially] intended to focus on diversity and introduce programmes to promote or enhance interactions between individuals of different fields and backgrounds, who otherwise find it difficult to meet and work with each other," explains Yoshifumi. "For the first time this year, we are organising a 'Pioneers' Panel. During this session, three seasoned industry pioneers from key fields will reflect on their professional careers and provide gems of advice for aspiring researchers. These very notable and renowned panellists are Steven Feiner (human-computer interaction and virtual/augmented reality), Takeo Kanade (computer vision and robotics) and Tomoyuki Nishita (computer graphics)."

SIGGRAPH Asia is an exciting event with fascinating and diverse programmes showcasing a variety of new technologies and art. A significantly wide range of people from a variety of fields and backgrounds typically participate.

This year it's hosted in the historic city of Kobe, Japan. In recent years Kobe and the surrounding Kansai region has been struck by natural disasters, and keynote speaker Professor Satoshi Tadokoro reflects on this point based on his experience and learnings from the disasters. He will discuss the introduction of efforts for promoting the social implementation of robotics as well as expected contributions from SIGGRAPH.

In terms of workshops some of the ones taking place include: Pixar, The Art and Science of RenderMan, which will be kicked off with a screening of its latest short, 'Sanjay's Super Team'; Intel Corporation, New Intel Processor Graphics accelerates Game and Media; Khronos Group, Khronos Graphics, Compute and Vision APIs including Vulkan Next Generation GPU Acceleration; Isotropix, Clarisse iFX: A new approach to 3D; and Google, Render more on Google Cloud platform and Zync. "Participants in these can look forward to product updates and detailed hands-on presentations introducing them to the latest developments in product innovation. Exhibitors will introduce their latest



ABOVE One of this year's technical papers includes a magnetic tracking system for dexterous 3D interaction

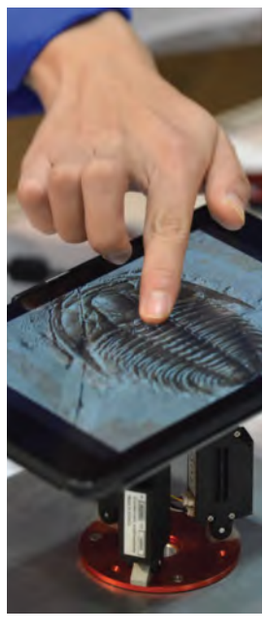
BELOW SIGGRAPH Asia will include the usual Posters, Technical Briefs and Workshop programmes

developments; demonstrate software, hardware and systems; answer questions; and talk about how their applications improve professional and technical performance," reveals Yoshifumi.

Two completely new symposiums; the Symposium on Education and the Symposium on Visualization in High Performance Computing will be introduced in addition to the regular programme offerings of Technical Papers, Art Gallery, Computer Animation Festival, Emerging Tech and more.

The Computer Animation Festival will feature a wide spectrum of intriguing visual creativity, as well as technical aspect of arts for three exciting days. "Hundreds of entries were reviewed by a preselection committee and jury," Festival director Jinny explains: "It is obviously not an easy task to maintain a high standard every year. However, we are very pleased to have works with a balance of artistic and technical excellence in computer generated animation that have been put together for Electronic Theater and Animation Theater this year again. With screenings, visitors can discover the wonders of creative challenges and innovative exploration of recent animated works in computer graphics and visual effects by experts from Disney [and] Pixar studios and Japan's six major animation studios."

The CAF Production Sessions Panels and talks include Abstract Thought from Pixar's *Inside Out* with speakers Jonas Jarvers, Masha Ellsworth, Albert Lozano, Ron Zorman and *The Good Dinosaur* with speakers Sanjay Bakshi, Matt Webb, Sharon Callahan and Ana Lacaze. "We are confident that the Computer Animation Festival will attract attendees with world-class creative and production talents who have created computer animation and visual effects in some of the most successful productions. Join us from 2-5 November."



> We are confident that the Computer Animation Festival will attract attendees with world-class creative talents
>
> **Jinny HJ Choo, Computer Animation Festival director**

Photos by Deborah Coleman / Pixar

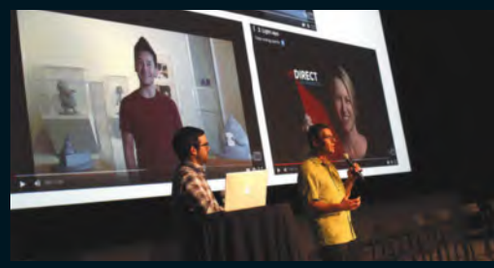
Pixar in a Box

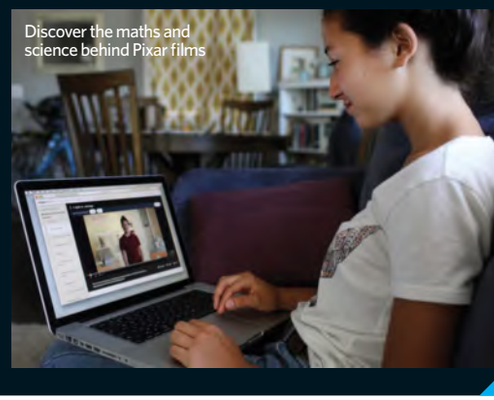
An engaging new internet-based training collaboration between Pixar and Khan Academy

Pixar in a Box is a free-to-use online learning resource aimed at providing school-level students and teachers with a modular curriculum that serves as an introduction to the maths and science behind Pixar film-making.

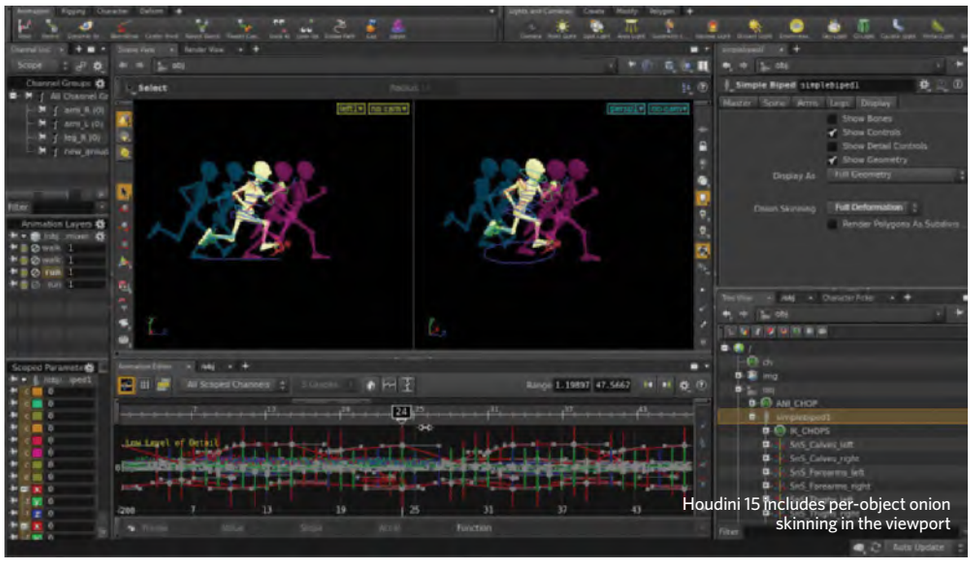
With training from artists, scientists, animators, sculptors and coders, it doesn't shy away from technical concepts and highlights how what is taught academically is applied in practice at Pixar. Core topics include environment modelling, character modelling, animation and many more. Topics consist of interactive exercises, hands-on activities and a library of video lessons that get more advanced as they progress. The videos are hosted by Pixar employees and as each topic concludes, there's an interview with the presenter where they discuss their professional journeys.

New content is planned to happen every few months for the next couple of years, with a module on computer programming lessons for rigging and simulation in the works next. To see the full curriculum and get started, go to **pixarinabox.org**.





Discover the maths and science behind Pixar films



Houdini 15 includes per-object onion skinning in the viewport

Houdini 15 released

Representing a huge workflow enhancement, the new Houdini iteration becomes more pipeline friendly

For the latest Houdini release, "Side Effects is working hard to bring Houdini's modelling, rendering and animation tools up to the level of its VFX tools," says Kim Davidson, president and CEO of Side Effects Software. "With more game studios creating content using procedural techniques, and commercial studios looking for artist-friendly tools, Houdini 15 offers a well-rounded solution."

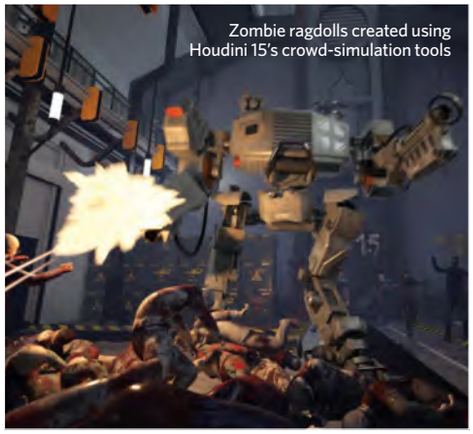
Updates for modellers include a new tweak edit workflow, edge sliding, soft-selection highlighting and new tools such as PolyBridge, PolyExpand 2D and high- to low-res retopology features.

Mantra gains checkpointing and render-view feedback, but there's also a new shader library for shader building, a rebuilt Shader FX 2.0 menu, layered materials, a cartoon shader, onion skinning, a pose library panel, an improved character picker panel as well as enhancements to the dope sheet benefit animators. There are also some new lightweight female and male character rigs included, alongside dual quaternion support for deforming twisting geometry and preventing volume loss.

Other improvements include an implementation of Disney's physically based Principled Shader. RenderMan 20 and RIS shading support is fully integrated into Houdini 15 too. Ragdoll dynamics have been added to crowd tools, along with limb detachment, fuzzy logic and better crowd behaviour. And the new adaptive PBD lets artists focus grain simulations on particles involved in collisions.

Houdini Engine 2.0

Version 2.0 has been designed to separate the API frontend from the backend. This allows for multiple sessions per host, multiple threads per host, greater stability and can be integrated without any library conflicts. A compiled 3ds Max plugin is due for release very soon and a UE4 plugin is due for mid-November. Maya and Unity plugins have been updated too.

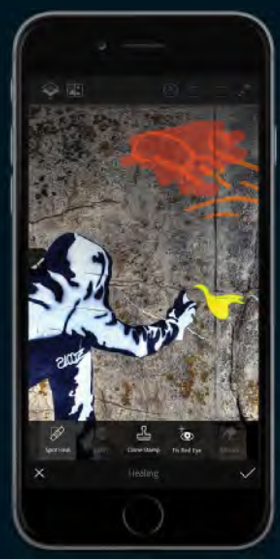


Zombie ragdolls created using Houdini 15's crowd-simulation tools

Adobe unveils on-the-go apps

New apps and updates for the Creative Cloud have been announced

At this year's annual Adobe Max 2015 conference, plans have been laid out for a 'connected creative canvas' designed to enable people the freedom to create and share their work from anywhere. Part of this mobile strategy includes the launch of two new apps for design on the go; Adobe Photoshop Fix and Adobe Shape CC. Photoshop Fix enables quick and easy image retouching and restoration and includes desktop features such as the Healing Brush and Liquify Tool. Adobe Shape CC combines Adobe's brushes, shapes and hues into one app that lets you turn photos into colour themes, unique looks, vector graphics or custom brushes that you can use in other Creative Cloud products. Coming soon, Adobe Portfolio is a new service that comes free with any Creative Cloud plan for non-coders to build a professional online portfolio – users will be able to sync it with their Behance accounts. Adobe Stock will also expand to include video content.



Photoshop Fix is released for iPad and iPhone, but isn't yet currently available for Android

HAVE YOU HEARD? Pixar announced changes to its upcoming schedule for releases beyond 2017 at New York Comic Con

Intel sells Havok to Microsoft

The deal helps strengthen Microsoft's intentions toward development innovation

Software giant Microsoft has announced the acquisition of 3D physics middleware company Havok via its official blog (bit.ly/1LXL26N) and promises to not make the technology exclusive.

Microsoft has said that it will "continue to work with developers to create great gaming experiences" and continue to license Havok's tools for development to partners. Havok has been used to create real-time physics for over 600 games including many triple-A titles, and will help boost Microsoft's gaming ambitions. The company plans to build Havok physics into the Xbox One processing cloud and deploy it in the upcoming *Crackdown 3*, which is set for release in 2016.

Havok is best known for its physics engine tech used in games like Bandai Namco's *Dark Souls*

Everything you need is offered in a single window, fully integrated inside the UVW Unwrap Modifier of 3ds Max

Natural 3D trees with The Grove

Growing 3D trees has just become easier and you'll have results within minutes

The Grove is a piece of software that provides a new way of growing naturalistic and groups of trees for visualisation, art and film. Trees are evolved interactively based on your chosen parameters and the immediate environment, which define the tree's life from sapling to tree.

For more common species such as oak, ash, maple and birch, there are modifiable presets. Resulting models are high quality and lightweight to render. It's ready for download now as a commercial plugin for Blender on OS X, Linux and Windows. More information is available at **thegrove3d.com**.

This nature scene created by Mason Menzies showcases what The Grove 3D can do

Raylight XrayUnwrap 2.0

After a successful crowd-funding campaign, a new version of the unwrapping tool is released

With a round of Indiegogo funding accomplished, XrayUnwrap 2.0 has been officially completed. Its newest features include a revised interface; new selection tools for vertex, edge, polygon, element and UV shell; enhanced seams tools; shell resymmetry enabling you to reflect or flip sides of an island or average both sides; four different checker map types for verifying the unwrapping; shell alignment within the UV space; overlapping shells for economic layouts by sharing the same UV space; and multitile UV offset to enable the organisation of UVW coordinates, which is handy for UDIM management. Currently available for 3ds Max 2009 and above, the Maya version is slated for release by the end of October. For more information, visit raylightgames.com/tools.

Software shorts

Bringing you the lowdown on product updates and launches

Maxwell Render V3.2

Enhancements include lat/long and stereo fish lenses for virtual reality systems such as Oculus, subsurface scattering improvements, faster fluid rendering courtesy of a new nested dielectrics approach, multilayered PSD render support and procedural emitters for applying emitter materials to entities like hair, fur and grass. Get it at **maxwellrender.com.**

Substance Designer 5.3

The power of Nvidia's Iray comes to Substance Designer. You can now switch instantly between the original renderer and high-end photorealistic renderer Iray. This adds features such as unlimited render resolution, true emissive materials, YEBIS real-time postprocessing and complex real-life materials. Find out more at **allegorithmic.com**.

Blender 2.76

Blender Foundation's latest release features a viewport performance boost, initial support for Pixar's OpenSubdiv geometry, Cycles volume density rendering with new Point Density textures, Node Auto-offset, new face flattening and edge offset modelling tools, video editing tools and bug fixes. Learn more at **blender.org**.

DID YOU KNOW? Aardman Animations has released a short animation to celebrate its partnership with Nathan Love

Halo 5: Guardians

We talk with Glasgow-based Axis about its ambitious creative work on the latest Halo game

Description Founded in 2000, Axis is an award-winning, international studio of directors, designers, artists, animators, writers and producers that creates content for the biggest names in videogames, film, television, commercials and online entertainment.

Website axisanimation.com

Location Scotland

Project *Halo 5: Guardians*

Project description Axis was charged with delivering VFX supervision, FX, compositing and character creation for the latest *Halo* game.

Studio Axis Animation

Contributors Richard Scott (managing director), Debbie Ross (executive producer), Sergio Caires (CG supervisor), and Stuart Aitken (creative director)

© 2015 Microsoft

Our conversation with Axis starts energetically with Richard Scott's enthused and excited breakdown about the major creative and industry profile opportunity that *Halo 5* represents for the studio: "Working on one of the biggest entertainment franchises in the world is always great for your profile."

Key to the work that Axis has undertaken on the project has been its collaborative work with other studios. Richard Scott recalls how: "We worked very closely with Brien Goodrich, the cinematic director at 343 Industries, and it was Brien driving the story and the performances. Pre-vis was already well into production and whilst Brien was keen to get feedback from Stu and our creative team, he knew exactly what he wanted and how to achieve it.

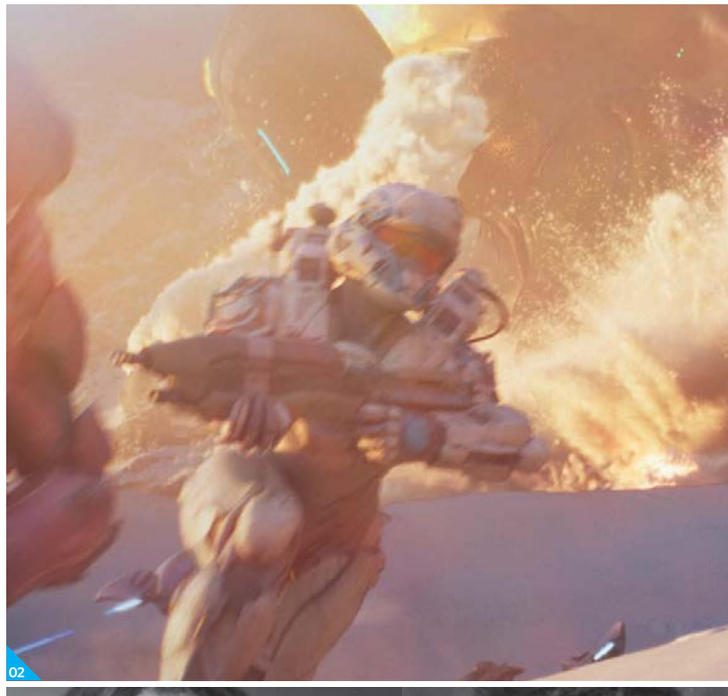
"We've been collaborating with 343 Industries for years since we worked with them on *Spartan Ops* for *Halo 4*. The *Halo* universe is so rich, and our lead creatives are so familiar with it that it is always a pleasure to dive back in. Creatively, the work we've done on *Halo 5: Guardians* has allowed us to really push ourselves with one of the most intense action scenes we've ever been offered. A lot of our work is very character focused: *Spartan Ops*, for example, saw us deliver ten episodes of character drama where the most important thing was compelling performances. The opening cinematic for the *Halo 5* performance is important for the early part of the film, but in the later part it was all about the action and our team really relished that.

"Being cinematic can mean different things to different people and as a studio we look for ways to do this with an eye for creating something unexpected. This is why, when we saw the first script and then the first pre-vis from 343 Industries, we knew this was a perfect project for us: epic scale and insane amounts of action. The kind of thing you'd see in a Hollywood feature film but for a game. That was unexpected."

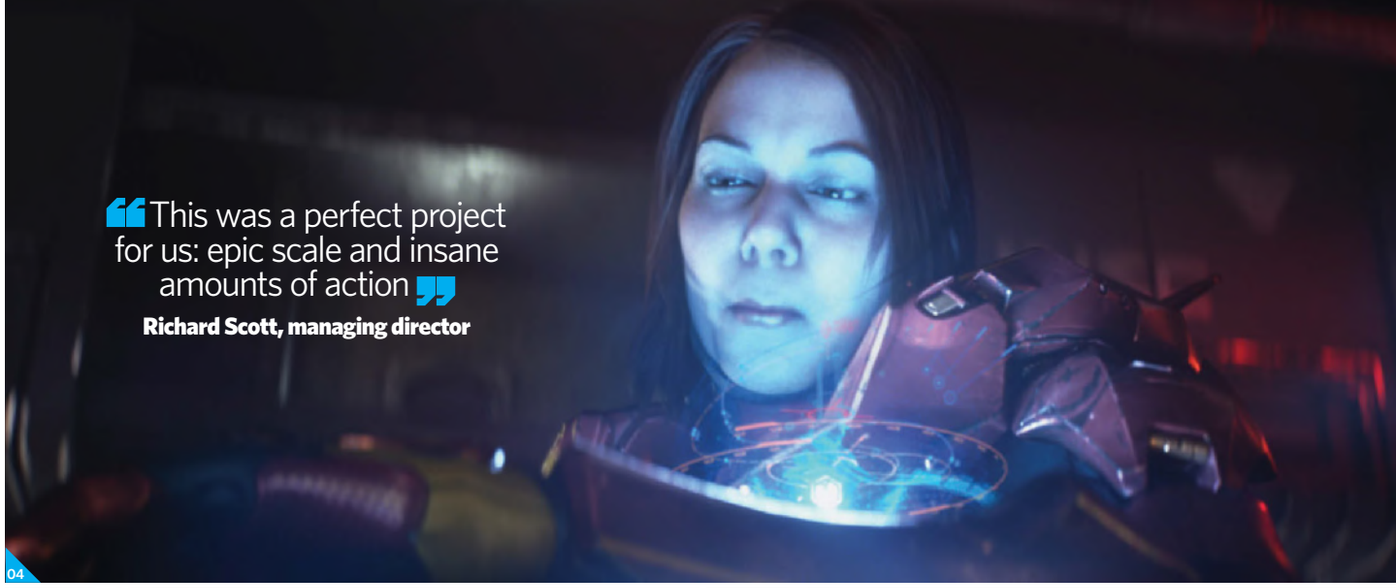
Our conversation then narrows its focus as Debbie Ross digs deeper into how the project let Axis push its creative application of software: "*Halo 5* has allowed us to push our character shading and lighting solutions, which are based on our in-house shading tools for Houdini. We really pushed large-scale complex environment creation with CG supervisor Sergio Caires working on voxel-based solutions in Houdini, as well as deploying recent R&D work on a planetary atmospheric scattering shader. This became a planet Earth asset, where the camera travels from space then flies through [the] atmosphere and detailed clouds to ground level."

Stuart Aitken rounds out the picture, explaining that: "There is a pretty clean separation between the animation and lighting, shading and FX stages at Axis – so making the switch to having 343 Industries handle pre-vis and animation fitted fairly well, with minimal changes to that part of our workflow. Essentially we had to get to the point where we were like two halves of a normal studio working together."

01

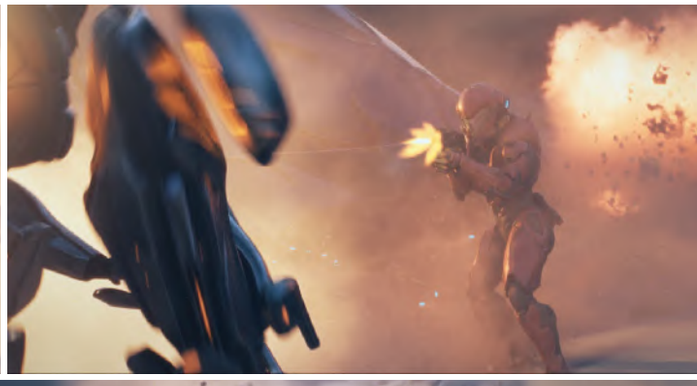

02

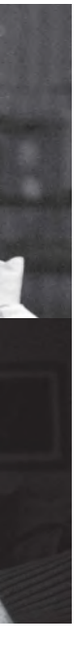
03

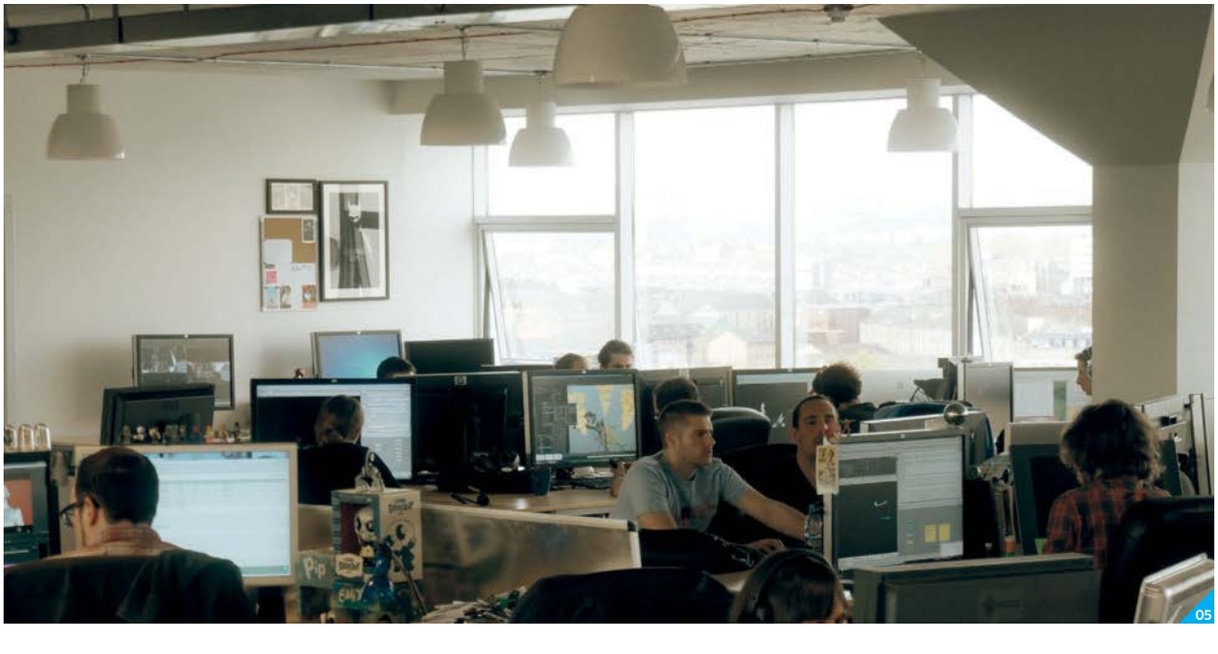


> This was a perfect project for us: epic scale and insane amounts of action
>
> **Richard Scott, managing director**

04







05

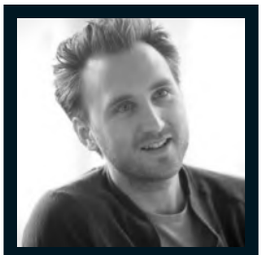
01 With *Halo 5*, Axis showcases its subtle work in creating characters and environments

02 *Halo 5* provided Axis with the opportunity to work within a highly cinematic style

03 Clockwise from top right: Brien Goodrich, Stu Aitken, Richard Scott, Sergio Caires

04 Axis extracted key hair strands from inherited assets to then input into customised hair tools

05 To manage the complex action sequences, Axis managed categories of assets as though they were one entity



Job CEO and founder, Escape Studios

Website pearsoncollegelondon.ac.uk

Location London

Biography After beginning his career in the UK visual effects industry where he worked at Double Negative, Glassworks and the BBC, Dominic Davenport recognised the need to develop formal training and education for students wanting to work as VFX artists.

Alumni Highlights

2016 *Inferno (Sophie Robinson), Tom Clancy's The Division (Ognyan Zahariev)*

2015 *Mission: Impossible – Rogue Nation, Spectre (John Gresko); Terminator Genisys (Sophie Robinson)*

2014 *Interstellar (John Gresko), Hercules (Sophie Robinson), Forza Horizon 2 (Ross Garfoot)*

Dominic Davenport

Founder, Escape Studios

Escape Studios' CEO talks about inspiring visual effects artists and the study programmes on offer

What's at stake in the brave-new world of cross-platform media and getting the next generation of creatives primed? They'll need to be software savvy, technically confident and well-versed in other skillsets that the 21st century digital practitioner needs at their disposal. Escape Studios is hoping to bring these skills to aspiring students with a curriculum underpinned by collaborations with SCEE, the Royal College of Art and Double Negative.

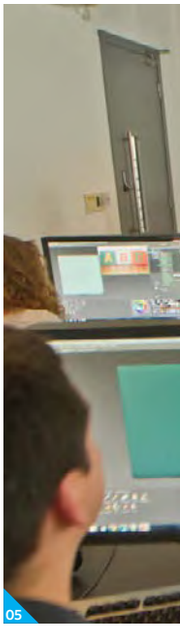
Our conversation with Dominic Davenport, founder of Escape Studios, part of Pearson College London, is characterised by Dom's high-energy insight into what makes the school tick. Dom starts with the school's background, "We started in 2002 and my background was in the visual effects industry. I took a distillation of how I'd entered the industry and boiled seven years into a three-month course." From there, Escape Studios has evolved into a key centre in London for students wishing to learn about and understand the disciplines of animation, game art and visual effects. As Dom stresses, these domains are interfacing evermore with each other. Critical to the offer that Escape Studios makes students is the involvement of professionals working in games, VFX and animation.

For Dom, the impulse is to nurture industry-ready students. "From the get-go, industry is engaged in the room," and Dom cites the contributions of Double Negative's Paul Franklin and of animation consultant Hugo Sands as two high-profile industry practitioners with course influence.

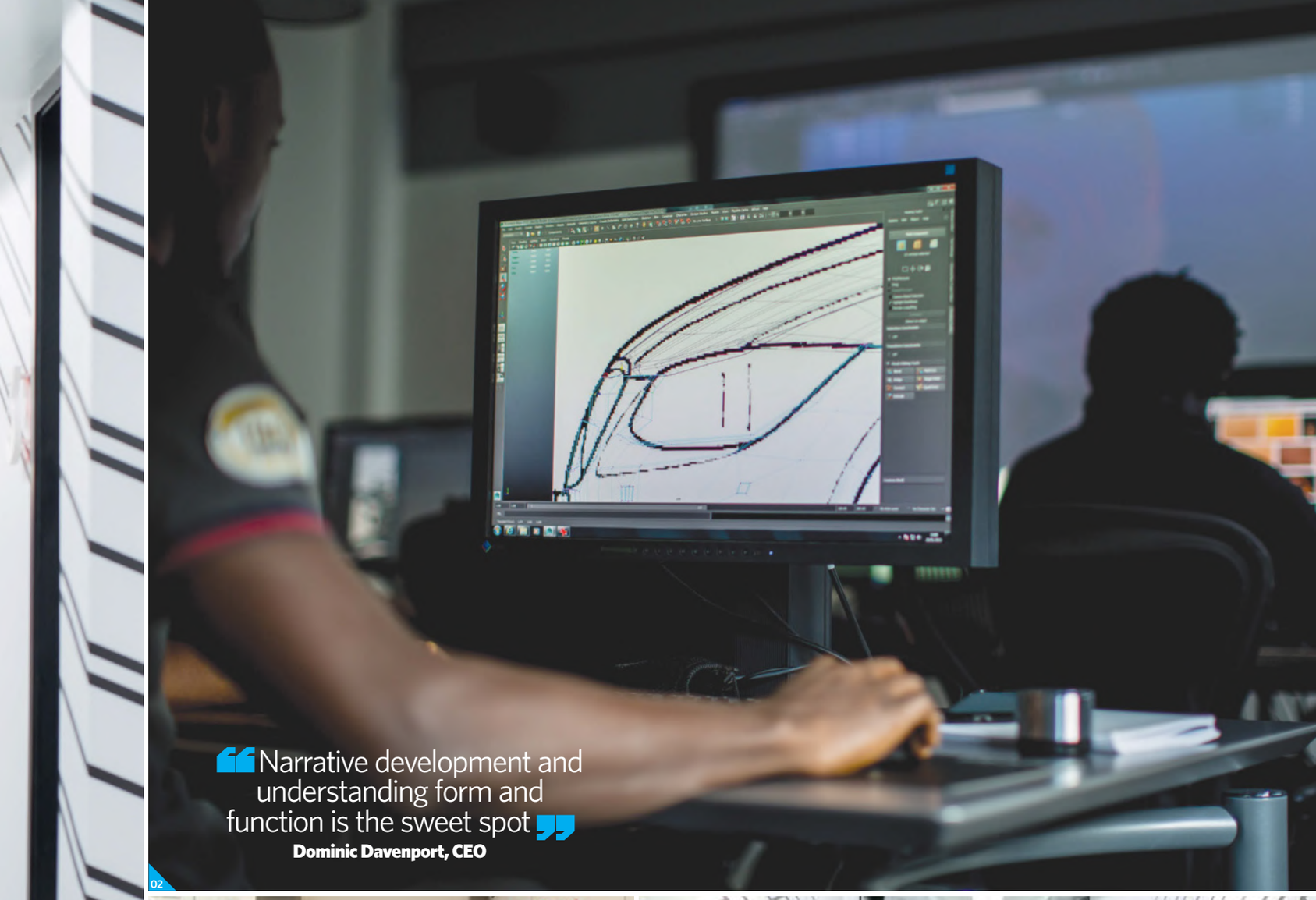
Alongside the varied training, Escape Studios' courses also develop students' soft skills in an ongoing effort to future-proof courses and the students graduating from them. Escape Studios offers a range of short courses and also a four-year integrated master's degree programme (starting in 2016) that comprises a full three-year undergraduate degree experience from which a student can then move directly into a master's programme. Dom summarises how the undergraduate programme works: "Year one foundation offers the students the chance to develop observation skills and narrative and film-making disciplines." Underpinning this first year is the chance for students to reflect on their work and develop an "understanding of why you do things and build a foundation." In the second year, students undertake "a collaborative group project driven by an industry brief and in year three they are focused around one large collaborative project that's very specific. The master's postgraduate year of study is all about taking the craft and adding commercial aspects to it.

Dom encapsulates Escape Studios' ambition as one of encouraging students to develop their sense of project viability, what it takes to make useful images and understand what it means to follow somebody's project leadership. Dom sums up his vision for teaching and learning with, "narrative development and understanding form and function is the sweet spot."

01

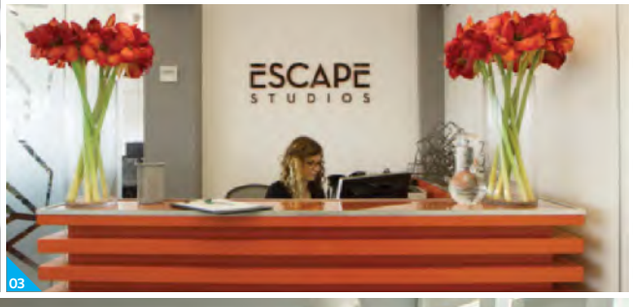


05

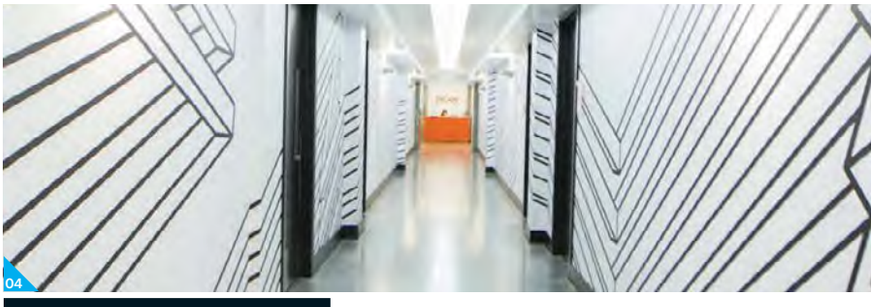


> Narrative development and understanding form and function is the sweet spot
>
> **Dominic Davenport, CEO**

02



03



04

A creative learning ethos

Dom outlines how Escape Studios' learning environments function

Dominic is keen to apply an art school ethos at Escape Studios, as art schools "are inspiring for exploration". Escape Studios is designed to encourage creativity by putting students of different disciplines in close proximity. Dom says this helps encourage an answer to the question: "What are the latest and greatest tips and tricks being used in one industry and applied to another?"

01 Escape Studios alumni have since gone on to exciting careers in industries like VFX, videogames and motion graphics

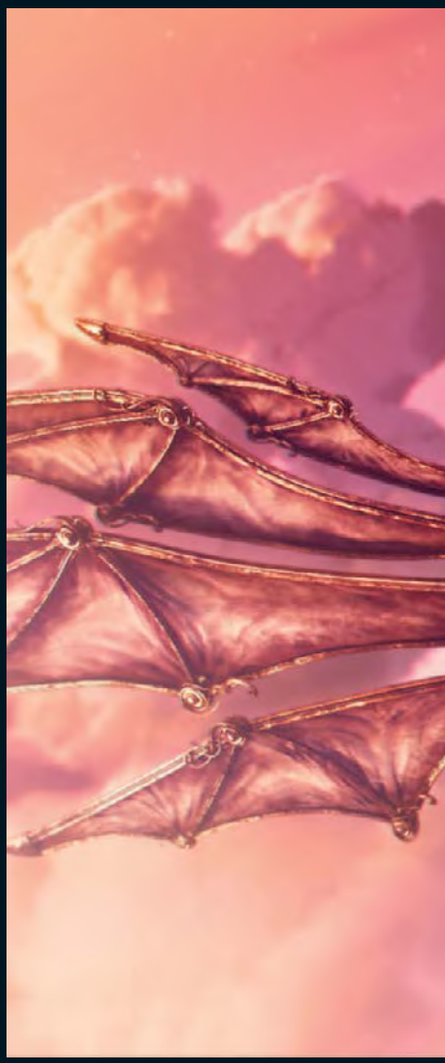
02 Dom notes that the big-picture plan for Escape Studios is to reimagine a higher education offer for the current state of the industry

03 Escape Studios is based in Shepherd's Bush, west London, and its short courses and full-time programmes are a core part of Pearson College

04 An art school style of ethos and sensibility certainly informs Escape's commitment to furthering creative exploration

05 At Escape Studios, emphasis is placed on the value of a space that can encourage a sense of creative community in its students

01



Images of the month

These are the 3D projects that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

01 X-mas
by Nita Ravalji
3DA username nitzz
Nita says: "I made this image in Blender and rendered it in Cycles. This was done for a Blender Guru competition in which I came second place!"
We say: *We can see why Nita placed so highly in the Blender Guru competition, as her image is fantastic and so joyful! We especially like the textures on the toys on the right-hand side of the scene.*

02 Queen of Hell
by Panuwat Bovornsirisarp
3DA username Eternity-nu
Panuwat says: "I made this in my spare time. I sculpted in ZBrush and used V-Ray for Maya for the render. I was inspired by *Lineage II* and *World Of Warcraft*."
We say: *There's a lot of detail in Panuwat's sculpt, making it very easy on the eye. Decent particle effects just add that little bit of finesse, resulting in a really strong character-led scene.*

03 Lake House
by Vic Nguyen Thanh
3DA username VicnguyenDesign
Vic says: "This is a commercial project located in Canada. I'm very happy with how the client gave me the freedom to create emotion and mood in my landscape and architecture."
We say: *This is a very peaceful image, but also one that is shrouded in mystery. Either way, it looks like a great place to live! It's a great composition also.*

04 Charlotte in the sky
by Maciej Rasala
3DA username Maciej Rasala
Maciej says: "Charlotte was prepared as a cinematic character; I wanted the image at the greatest detail so it's composed of about 60 textures and 720,000 polygons."
We say: *We love the steampunk aesthetic that Maciej has achieved here. The whole composition is extremely interesting and you can see all of the detail that he's mentioned!*

02

Image of the month

04

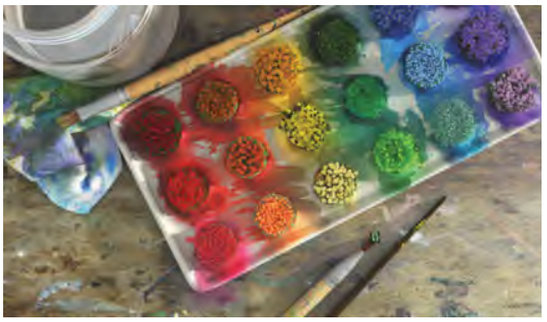
03

Mech Armour Concept **by Marcus Whinney**

3DA username Marcus

Marcus says: "This is a study into hard-surface modelling techniques using ZBrush and Maya. I composited the scene in Photoshop."

We say: *There's a quality sheen to Marcus's mech image, and we love the vibrant, menacing glare of the blue eyes that he's included. The smoke and camera effects add a lot, too. The finishing touches like the fog effect are well realised.*



Watercolor **by Cynthia Decker**

3DA username Curious3D

Cynthia says: "I just recently decided to start painting again, so I dug out my watercolours. I love how they look: all stained, dried up and well used. This is a love letter to my old paints."

We say: *We love all of the colours in this scene. Cynthia has done a great job of paying close attention to the overall scene as well as its individual components.*

Dj27 **by Roldan R Narag**

3DA username roldannarag

Roldan says: Dj27 is a military combat mech and one of my 3D character designs for a CG film. Everything was rendered and textured using Cinema 4D. The concept art is by Jason Cato."

We say: *There's something quite* Metal Gear Solid *about Roldan's combat mech, which is always a good thing. We like the fact that he's included a human figure at the bottom to provide a sense of scale.*

Hercules the Greek God **by Yavuz Selim Balcioglu**

3DA username Lordlight

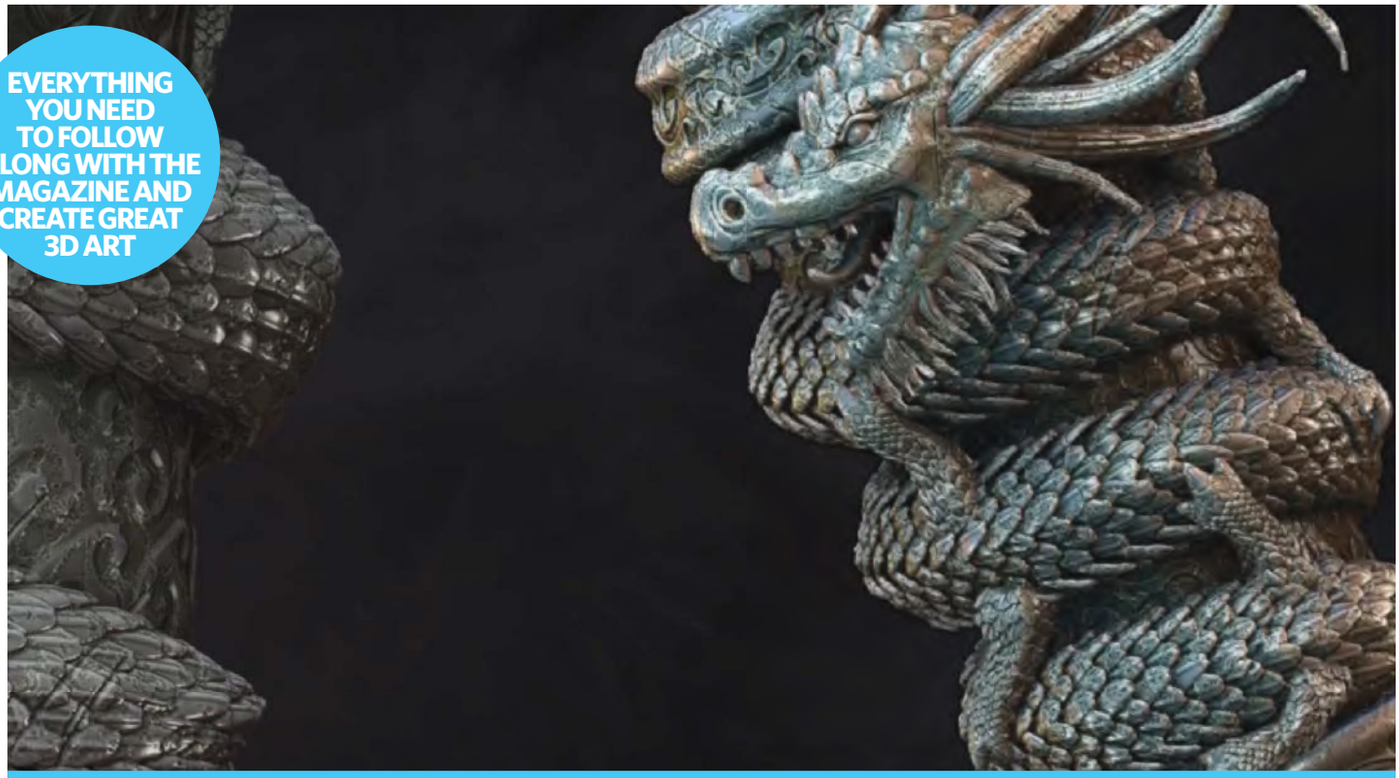
Yavuz says: "Here I've tried to capture Hercules' likeness. I used lots of references for him, especially from museums. Inspiration from people like Leonardo da Vinci and Michelangelo is very important to me."

We say: *We're big fans of classical sculpture, and this is a great example. Check out Yavuz's profile on **3dartistonline.com** – he's done plenty more like this one!*

YOUR FREE RESOURCES

Log in to **filesilo.co.uk/3dartist** and download your 3D resources **NOW!**

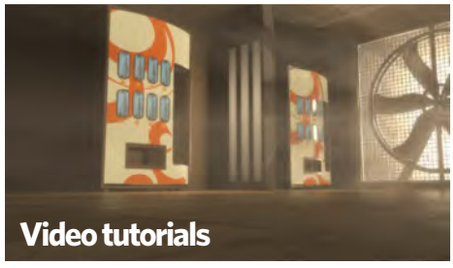
EVERYTHING YOU NEED TO FOLLOW ALONG WITH THE MAGAZINE AND CREATE GREAT 3D ART



DIGITAL-TUTORS SCULPTING TUITION

CGAxis models

25 3DTotal textures



Video tutorials

THIS MONTH'S COMBINED RESOURCE SIZE: 6GB

filesilo.co.uk/3dartist

YOUR BONUS RESOURCES

ON FILESILO THIS ISSUE, FREE AND EXCLUSIVE FOR 3D ARTIST READERS, YOU'LL FIND 6GB OF RESOURCES, INCLUDING...

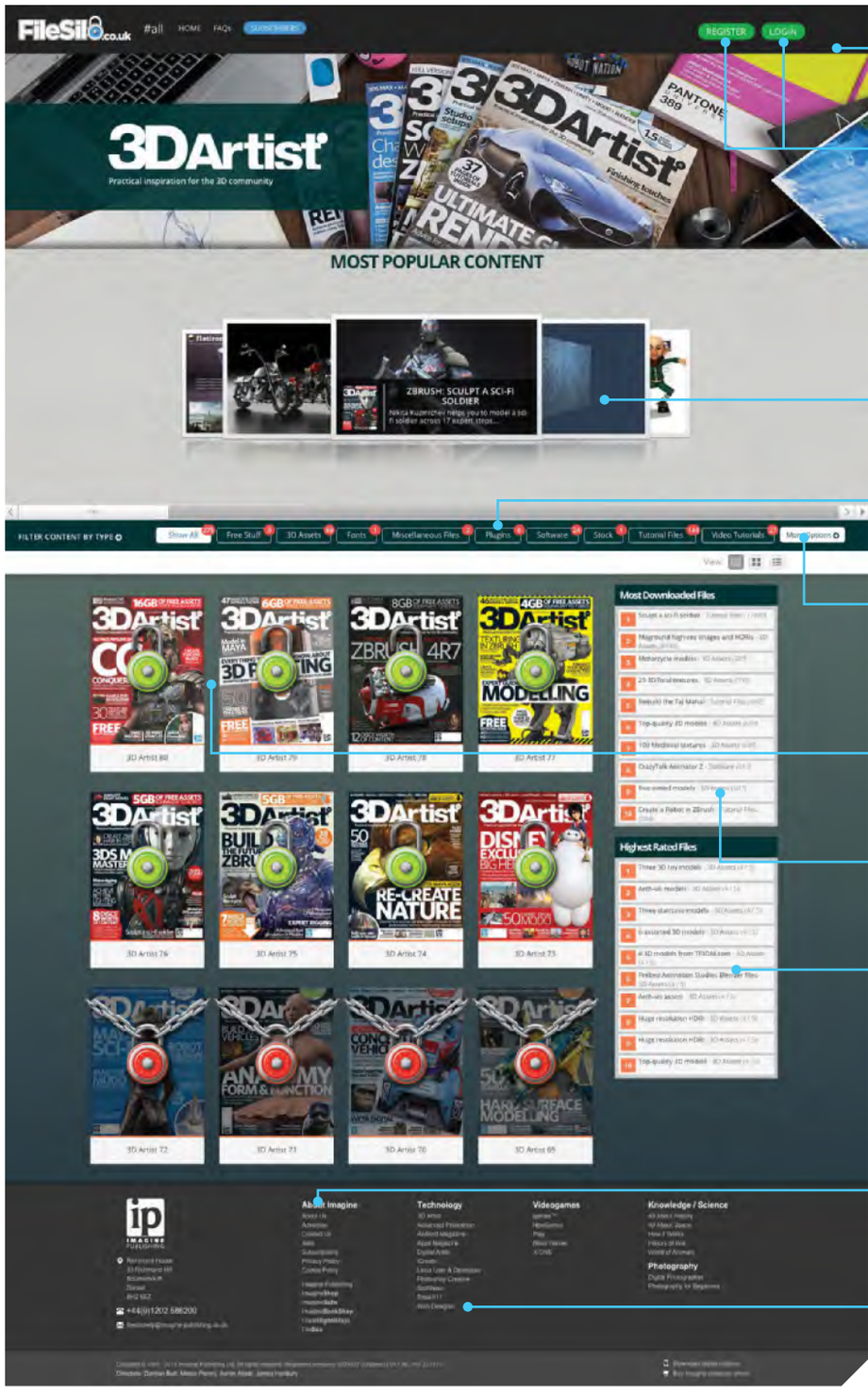
- Over three hours of quality ZBrush video tuition from the experts at Digital-Tutors. Learn to sculpt an incredibly detailed dragon scroll asset!
- Premium 3D models from CGAxis for you to use in your work
- 25 awesome sky and environment textures from 3DTotal
- A huge selection of images, videos and files from our tutorials

FileSilo

FILESILO – THE HOME OF PRO RESOURCES

Discover your free online assets

- A rapidly growing library
- Updated continually with cool resources
- Lets you keep your downloads organised
- Browse and access your content from anywhere
- No more torn disc pages to ruin your magazines
- No more broken discs
- Print subscribers get all the content
- Digital magazine owners get all the content too!
- Each issue's content is free with your magazine
- Secure online access to your free resources



This is the new FileSilo site that replaces your disc. You'll find it by visiting the link on the following page

The first time you use FileSilo, you'll need to register. After that, you can use your email address and password to log in

The most popular downloads are shown in the carousel here, so check out what your fellow readers are enjoying

If you're looking for a particular type of content, like software or video tutorials, use the filters here to refine your search

Can't find the resource you're looking for in these filters? Click on More Types to specify what kind of resource you want

Green open padlocks show the issues you have accessed. Red closed padlocks show the ones you need to buy or unlock

Top Downloads are listed here, so you can get an instant look at the most popular downloaded content

Check out the Highest Rated list to see the resources that other readers have voted for as the best

Find out more about our online stores, plus useful FAQs such as our cookie and privacy policies and contact details

Discover our fantastic sister magazines and the wealth of content and information that they provide

HOW TO USE FileSilo

EVERYTHING YOU NEED TO KNOW ABOUT ACCESSING YOUR NEW DIGITAL REPOSITORY

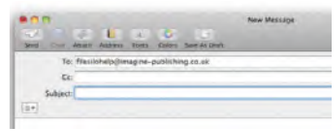
To access FileSilo, please visit **filesilo.co.uk/3dartist**

01 Follow the on-screen instructions to create an account with our secure FileSilo system, and then log in and unlock the issue by answering a simple question about the magazine. You can access the content for free with each issue of **3D Artist**.

02 If you happen to be a print subscriber, you can easily unlock all the content by entering your unique Web ID. Your Web ID is the eight-digit alphanumeric code that is printed above your address details on the mailing label of your subscription copies. It can also be found on any renewal letters you receive.

03 You can access FileSilo on any desktop, tablet or smartphone device using any popular browser (such as Safari, Firefox or Google Chrome). However, we recommend that you use a computer to download content, as you may not be able to download files to your phone or tablet.

04 If you have any problems with accessing content on FileSilo, or with the registration process, take a look at the FAQs online or email **filesilohelp@imagine-publishing.co.uk**.



NEED HELP WITH THE TUTORIALS?

Having trouble with any of the techniques in this issue's tutorials? Don't know how to make the best use of your free resources? Want to have your work critiqued by those in the know? Then why not visit the **3D Artist** Facebook page for all your questions, concerns and qualms? There is a friendly community of fellow 3D artists to help you out, as well as regular posts and updates from the magazine team. Like us today and start chatting!

facebook.com/3DArtistMagazine

Issue 88 of **3D Artist** is on sale **27 November 2015** from **GreatDigitalMags.com**

Where ideas take shape.

Bring your projects to life with Shutterstock's diverse library of over 60 million images, videos, and audio tracks. Flexible monthly payment options, innovative search tools, and no daily download limits make creating even easier.

www.shutterstock.com

Buy now and save 20% on images and video with code: **3DARTIST**

Standard license only. Offer expires 31/1/16.

shutterstock

THE DIGITAL ANIMATION & VISUAL EFFECTS SCHOOL

DAVE SCHOOL

www.daveschool.com

MALUSI TUGWANA
2015 GRADUATE

"If I've learned anything from The Dave School, it would be the value of hard work, determination and the importance of having a strong passion for doing something you love. At the end of the day, coming to The DAVE School was one of the best decisions I've made in my life and I would implore any other aspiring 3D Artist to do the same."

ACADEMIC PARTNER

TO SPEAK WITH ADMISSIONS OR TO SCHEDULE A TOUR, PLEASE **CALL (855)328-3839**
THE DAVE SCHOOL IS LOCATED ON THE BACK LOT OF **UNIVERSAL STUDIOS FLORIDA®** IN ORLANDO.

THE DAVE SCHOOL IS NOT OPERATED BY NOR AFFILIATED WITH UNIVERSAL ORLANDO®